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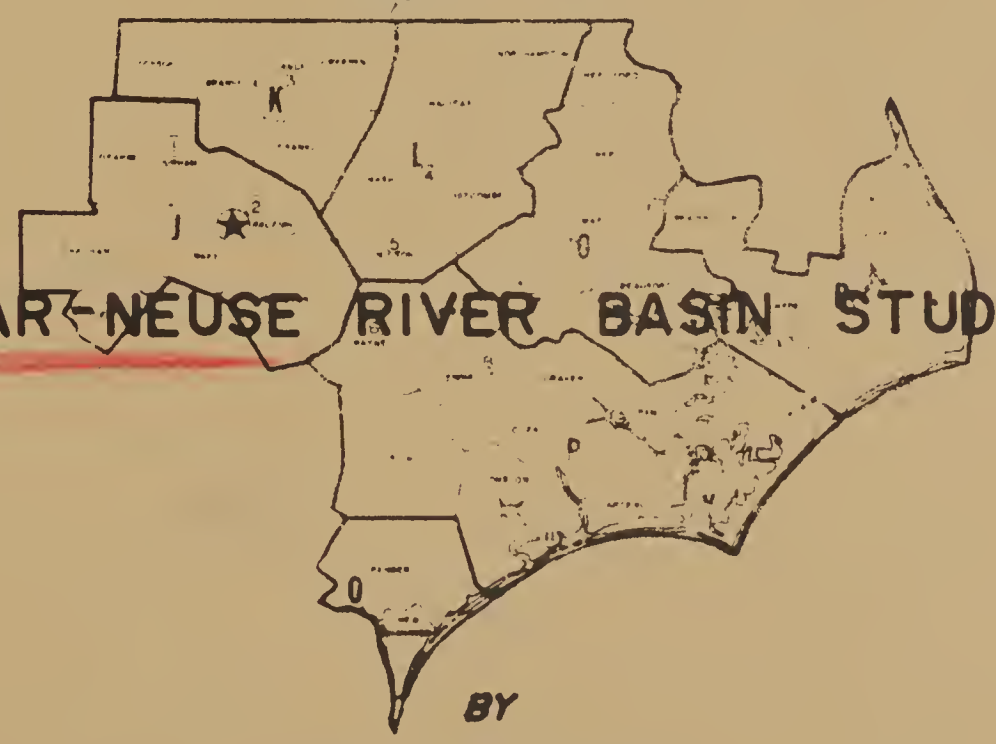
# CURRENT AND PROJECTED POPULATION, EMPLOYMENT, AND INCOME, TAR-NEUSE RIVER BASIN NORTH CAROLINA

## Economic Base Information Report No. 1



## TAR-NEUSE RIVER BASIN STUDY

BY

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ABSTRACT

The objective of this report is to describe the population, employment, and income in the Tar-Neuse River Basin, North Carolina and present appropriate historic, current and projected estimates of the parameters for 1980, 2000, and 2020. The information will be used in planning the development of the natural resources - water and land, and is needed to assess the effective and efficient use of these resources.

Population in the study area has grown steadily in the recent past and projections show a continued growth. In the past the steady growth has resulted, in spite of the out-migration, from more births than deaths. In the future, a decline in the birth rate will be somewhat offset by a reduced out-migration, permitting a continued increase in the population.

There were a greater number of people employed in 1970 than in 1950 in the study area, but this increase was less than the increase in the civilian labor force, resulting in an increased unemployment rate. For the entire area, unemployment is above that for the state by about one percent in 1972. Three counties in the study area, for some months in 1972, had unemployment of six per cent or more.

Personal and per capita income has increased from 1950 to 1970 in the study area. Per capita income is expected to be $1,000 more in 1980 than the $2,600 in 1970, and is likely to be about the same as for the state in 2000.

KEY WORDS: Economic base, North Carolina, river basin, projections, population, employment, income, natural resources

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# PREFACE

The U. S. Department of Agriculture (USDA) is studying the Tar-Neuse River Basin at the request of, and in cooperation with, the state of North Carolina. The agencies of the USDA involved in the study are: the Economic Research Service, Soil Conservation Service, and the Forest Service. The coordinating agency of the state is the Office of Water and Air in the North Carolina State Department of Natural and Economic Resources.

The Economic Research Service is responsible for developing four reports that provide basic information to the study participants and to the main report of the study. Three of the reports involve the economic resource base of the study area and one the economic impact of resource development. The subjects of the three economic base reports are:

- Current and Projected Population, Employment, and Income, Tar-Neuse River Basin, North Carolina

- Agriculture and Forestry Economic Characteristics Tar-Neuse River Basin, North Carolina

- Current and Projected Land Resource Availability, Use, Productivity, and Production, Tar-Neuse River Basin, North Carolina

Each economic base report will consider the river region and how it relates to North Carolina. The evaluations of land use and productivity will be made considering the historical rate and an accelerated rate of resource development. The subject of the economic impact report is:

> The Economic Impact of Water and Related Land Resource Development in the Tar-Neuse River Basin, North Carolina

Many people have contributed to this first economic base report, and their work is recognized in the footnotes of the report. However, I would like to express a special appreciation to:

Carl "Pete" Swenson and Donald Sherry of the North Carolina Department of Administration, Office of State Planning, and George Denning, at the time with North Carolina Department of Natural and Economic Resources, Office of Water and Air, Raleigh, for reviewing and making helpful suggestions on the population projections. Dr. John E. Hostetler, Field Leader in the Natural Resource Economics Division of the Economic Research Service, Upper Darby, Pennsylvania, reviewed the report in detail noting my clouded philosophical rhetoric. He gave encouragement by recognizing my "many new ways of looking at a study area". William H. Heneberry, Deputy Assistant Director, and Louise Samuels, Editor, Natural Resource Economics Division, Washington, D. C., made many constructive comments on style and clarity. And last but not least,

I want to thank Joyce Pearce, Soil Conservation Service, Raleigh, for being patient in typing the seemingly endless drafts. However, the report is a product of the Economic Research Service of the U. S. Department of Agriculture.

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## BIOGRAPHICAL SKETCH

John R. Parks is an agricultural economist in the Natural Resource Economics Division, Economic Research Service, U. S. Department of Agriculture. Before assuming his present position, he was employed by the Doane Agricultural Service, Inc., St. Louis, Missouri, as a consulting farm manager and rural appraiser. Prior to this, he did research in farm management and marketing with the Agricultural Research Service of the U. S. Department of Agriculture in a cooperative arrangement with the Alaska Agricultural Experiment Station, Palmer, Alaska. Mr. Parks holds degrees from Penn State and Kansas State Universities.

# SUMMARY-CONCLUSIONS

## SUMMARY

Population has been growing steadily in the Tar-Neuse Study Area (T-N SA) in the coastal plains of North Carolina since 1940. Within the study area, Multi-County Planning Regions (M-C PR) J and P have had the most rapid upward growth, while the population change in M-C PR K, L, and Q has been quite stable. Steady upward growth in population is expected for the future to 2020, which is in part a result of the birth rates. There have been more births than deaths up to 1970, although the ratio of births to deaths is declining. An inference from the North Carolina birth rates is that the birth rates in the Tar-Neuse Study Area will likely decline in the long run.

A large number of people (137,000) left the Tar-Neuse Study Area in the 1950's, but the out-migration from the study area is declining. An in-migration occurred in M-C PR J between 1960 and 1970, and except for Region P in the 1950's, all other regions in the two decades had from 17,000 to 46,000 people (net) leave the regions.

Durham and Raleigh in 1970 are the only cities with populations over 100,000 in the study area and are located in the headwaters of the river basin. The centers of population are large and more dense in the headwaters than along the coast. Previously the centers of population were nearer the coast. While the shift in populations

from the coast to the headwaters was taking place, more of the people were also moving into urban environments.

By age groups, senior citizens are gradually increasing in number; at the same time, those under 15 years stabilized in 1960 and have since declined; people in the working age group (15-64 years) have increased since 1960. Considering the total population, its median age was 24.2 in 1950, increasing to 25.9 in 1970; while the population in the nation was getting younger.

Health services in the Tar-Neuse Study Area are above that for the state, but somewhat below the average for the nation. For example, there is one doctor for 823 people in the study area, one for 1,067 people in the state, and one for every 777 people in the nation. Other health services are also above that for the state and slightly below that for the nation.

One out of five families in the Tar-Neuse Study Area in 1970 was classified as having income below the poverty level, which was $3,668. These 82,000 families had a mean family income of $2,060, which was about the same as for North Carolina. In the nation, one out of ten families had income less than the poverty level--their mean family income was $1,935 when the poverty level was set at $3,477.

For the entire study area, unemployment is above the state by about one percent in 1972. Unemployment is greatest in Regions L

and Q and least in J; Bertie County, located in Region Q has "substantial" unemployment; Green County, in Region P, and Pender County, in Region O, have "persistent" unemployment. In 1972 unemployment ranged from 9.9 percent in Hyde County to 1.9 percent in Wake.

Military personnel numbered 52,700 in 1970, up from 112 in 1940. Although they were located in 30 out of 35 counties in the study area, the large bulk of the military personnel was in Wayne, Onslow and Craven Counties. The military component of the labor force in the study area is not expected to increase.

A civilian labor force of 572,000 in 1970 was 92 percent of the total labor force, somewhat lower than the proportion in the national labor force which was 96 percent at the same time. The higher proportion of military to civilian labor force caused the difference. The women in the civilian labor force increased 72 percent and the men increased 10 percent between 1950 and 1960 in the study area. This closely parallels the trend in the nation. Agriculture and textiles in the study area lost employment in the 1940's and 1950's and because they are important industries, their loss of employment has offset, to a large extent, gains in employment in armed forces and professional service. The number in armed forces by 1980 is expected to decline; but agriculture is expected to lose the largest number of those employed.

The important industries in 1950 in the study area as compared with the nation were: agriculture, forestry and fishery, armed forces and civilian government. The same industries are likely to be important in 2020 along with manufacturing. Within the manufacturing sector, the following industries are expected to grow in importance:

apparel and other allied products
chemicals and allied products
electrical machinery and supplies
machinery excluding electrical.

Those expected to become less important are:

textile mill products
lumber products
food and kindred products

Industries of the study area that are important and are usually large water-users are:

textile mill products
chemicals
electrical machinery
agriculture

In the Tar-Neuse Study Area, personal income increased over two times between 1950 and 1970, while population increased about 20 percent. On a per capita basis personal income doubled from $1,300 in 1950 to $2,600 in 1970. Per capita income in 1980 is expected to be $1,000 more than the $2,600 in 1970. Per capita income in the study area has always, since 1950, been below the state, and the state's per capita income less than the nation.

Near 2000, however, the study area's per capita income will be about the same as for the state.

Two out of three families in the study area in 1960 had incomes less than $5,000; however by 1970, this ratio had dropped to one out of three. At the upper end of the family income scale about one out of ten had family incomes greater than $8,000 in 1960 when in 1970 almost every other family had an income of $8,000 or more. Family incomes increased about six percent from 1959 to 1969.

## CONCLUSIONS

Most water and related land resource problems will likely be in the headwaters of the Tar-Neuse Study Area, specifically Multi-County Planning Region J and, to a lesser extent, K. The problems will probably be most acute between 1980 and 2000. Land resource problems would seemingly be related to space and crowding, erosion from construction sites, solid and liquid waste disposal and environmental degradation. Problems will arise mainly as a result of more people in these regions where there has been a net in-migration.

Resource problems in the downstream areas of the study area probably will be: water - flooding, scouring and erosion of cropland; and land - drainage of excess water, erosion by water, wind or both, and unfavorable soil conditions. These problems are likely to appear because this area is more rural agricultural and low-lying.

Out-migration is likely to continue from the study area. Although there are only three out of 35 counties with difficult unemployment problems, a number of other counties from time to time have had high unemployment. The skill and capacity of the labor force in parts of the study area, particularly Multi-County Planning Regions K, L, and Q are not likely to be attractive to industries because of the educational levels. The educational level is improving but below the average for the nation.

In the long run, economic opportunity is likely to improve in the Tar-Neuse Study Area. There has been a shift of people in sizeable numbers out of low-paying industries to service, wholesale-retail trades and manufacturing that generally pay better wages. Further, these three industries, especially manufacturing, have improvement prospects.

The market demand in the short run for most of the study area appears to be for basic human needs--food, clothing and shelter. Personal income, although rising on a per capita and family basis, is below the state and nation. The income will likely be spent on current consumption rather than on long-term investment. The conclusion is further supported indirectly by an unexplained fact that a low percent of those in the poverty category are receiving public assistance.

The social well-being appears to be improving. In economic terms--more people, especially women, are employed; family incomes and earnings are improved over the 1960 estimates and will apparently continue to improve. In non-economic terms--people are living to an older age; health care is improving; and the level of education is rising.

# INTRODUCTION

## PURPOSE

This first report on the economic base describes some of the resources in the Tar-Neuse River Basin and relates resource use and productivity to human welfare. Further it provides information for planning the development of natural resources. Resource planning supports more comprehensive planning which the state of North Carolina is encouraging. This information is needed to assess the effective and efficient use of resources and will support recommendations for resource development in the basin.

## PROBLEM

In recent decades North Carolina's industries, including agriculture, have made significant changes. Many forces such as improved technology, new management and business techniques, market situations, increased urbanization and others have caused these changes. With these changes come the concerns about the competitive position of North Carolina's agriculture and other industries.

Planning natural resource use is needed to meet the changing demands of a maturing society. Information concerning the economic use of these resources is needed in the planning process. Economic information can indicate alternative development programs that may affect the allocation of scarce resources. A better allocation of water and related land resources will help to maintain a viable economy and a proper place for industry and agriculture.

A national concern is for the best conservation, management and use of the natural resources, and this concern manifests itself in resources that are owned in common. Some of these resources owned in common are water, air and, to a minor extent, land. Except for land, property rights are not clearly fixed in these resources. Because of the lack of identity of the resource owner, the individual lacks the incentive to properly conserve, manage and use the resources owned in common. Government then must exercise a concern for these resources. Federal, state, and local government agencies conduct studies to evaluate resource problems such as flooding, improper draining and polluting of land and water. The studies aid in the formulation and evaluation of alternative development plans which help to solve the water and related resource problems.

SCOPE

This economic base report discusses the population, employment, and income in the Tar-Neuse Study Area. The analysis of these parameters will uncover land and water management problems associated with population, employment and income.

Two main geographical study areas will be referred to in this report; viz, the Tar-Neuse Study Area (T-NSA) and the Tar-Neuse Hydrologic Area (T-NHA). The scope of the study area is in terms of Multi-County Planning Regions (M-C PR). They are: M-C PR - J, K, L, P, Q and a residual of counties from Regions O and R. The

residual counties are Dare, Hyde, New Hanover, Pender and Washington (Figure 1). The scope of the hydrologic area is the drainage of the Tar River, the Neuse River and the South Atlantic Gulf Drainage Area [1/] (SAGDA) (Figure 2).

The Tar-Neuse Study Area boundary does not follow the hydrologic area boundary of the rivers or the SAGDA. But the study area roughly approximates the hydrologic area while at the same time maintains the integrity of the planning regions and best represents the economic trade areas. The study area contains 35 whole counties, while the hydrologic area[2/] contains 29 whole and partial counties (Table 1).

Information is reported for appropriate historical periods and where possible, projections made at 20-year intervals; 1980, 2000, and 2020. The availability and appropriateness of the data dictated the length of the historical series. In certain instances short historical data series were adequate for evaluating trends, in others longer series were necessary. The study needs dictated the length of the projection periods.

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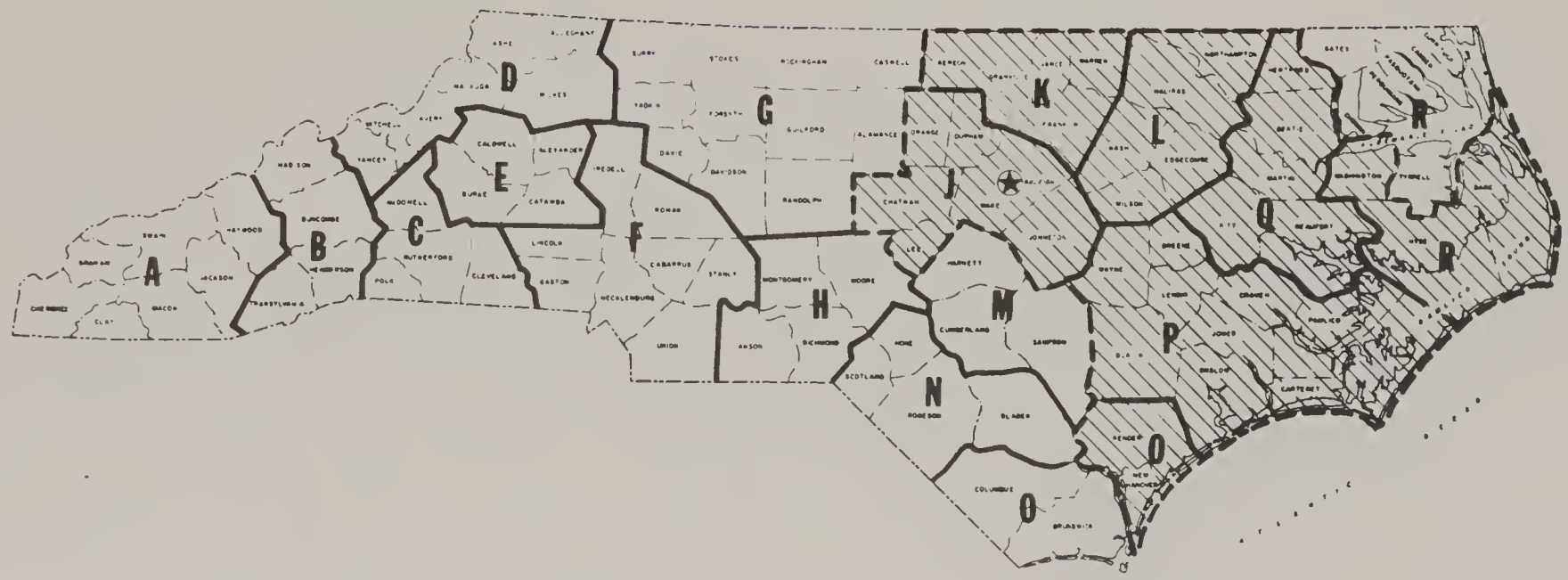
1/ River Basin Atlas of the United States, U. S. Department of Agriculture, Soil Conservation Service, Washington, D. C., revised June 1970, Map No. 6.

2/ Some information later in the report relates to another area that is referred to as the Water Resource Subarea (WRSA). The WRSA, established by the Water Resource Council, closely approximates the hydrologic area shown in Figure 2, but does not facilitate the local planning objectives.

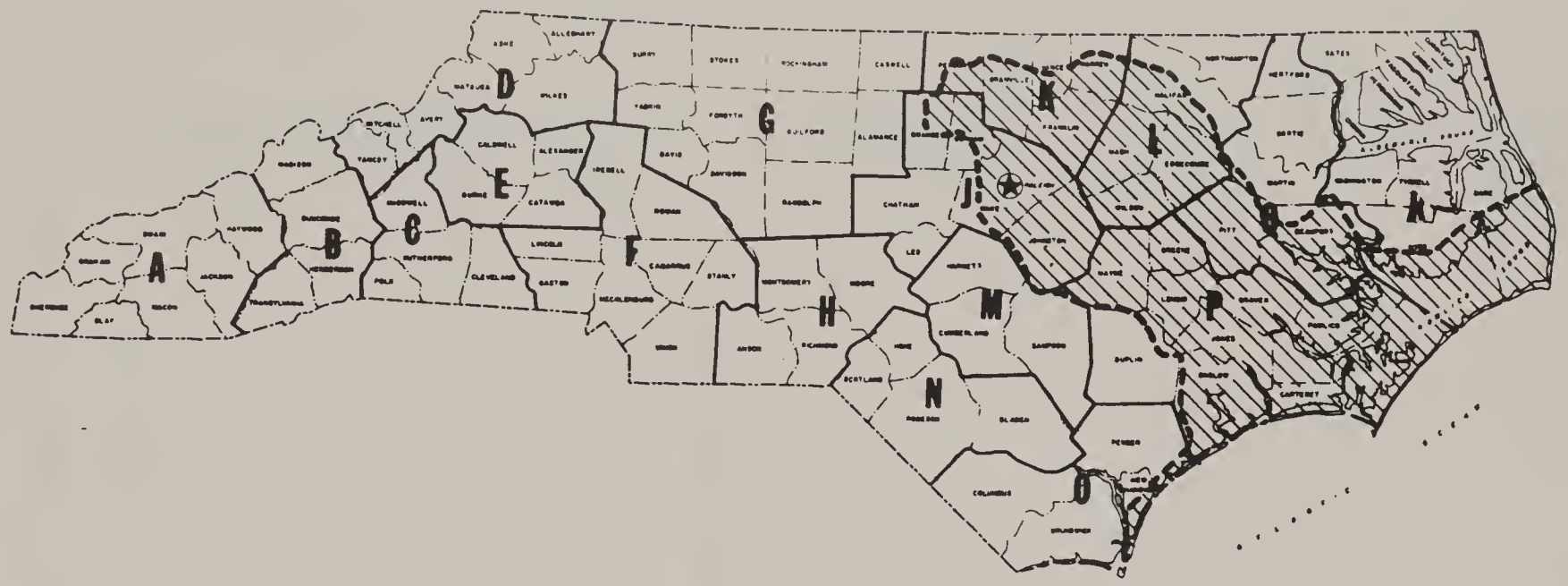
**North Carolina Multi-County Planning Regions showing the Tar-Neuse Study Area**




SOURCE: Multi-County Planning Regions established by Robert W. Scott, Governor of North Carolina, Raleigh, May 7, 1970, as approved by the Field Advisory Committee for the Tar-Neuse River Basin Study.

FIGURE 1

North Carolina Multi-County Planning Regions showing the Tar-Neuse Hydrologic Area




SOURCE: Multi-County Planning Regions established by Robert W. Scott, Governor of North Carolina, Raleigh, May 7, 1970, and U. S. Department of Agriculture, Soil Conservation Service, Atlas of River Basins of the United States, Washington, D. C., revised, June 1970, as approved by the Field Advisory Committee for the Tar-Neuse River Basin Study.

FIGURE 2

Table 1 - Counties in the Tar-Neuse River Basin Study, North Carolina

## Study Area

### Region J

1. Chatham
2. Durham
3. Johnston
4. Lee
5. Orange
6. Wake

### Region K

1. Franklin
2. Granville
3. Person
4. Vance
5. Warren

### Region L

1. Edgecombe
2. Halifax
3. Nash
4. Northampton
5. Wilson

### Region P

1. Carteret
2. Craven
3. Duplin
4. Greene
5. Jones
6. Lenoir
7. Onslow
8. Pamlico
9. Wayne

### Region Q

1. Beaufort
2. Bertie
3. Hertford
4. Martin
5. Pitt

## Hydrologic Area

1. Beaufort
2. Carteret
3. Craven
4. Dare
5. Durham
6. Edgecombe
7. Franklin
8. Granville
9. Greene
10. Halifax
11. Hyde
12. Johnston
13. Jones
14. Lenoir
15. Martin
16. Nash
17. New Hanover
18. Onslow
19. Orange
20. Pamlico
21. Pender
22. Person
23. Pitt
24. Vance
25. Wake
26. Warren
27. Washington
28. Wayne
29. Wayne

## Hydrologic Residual (HR)

1. Dare
2. Hyde
3. New Hanover
4. Pender
5. Washington

Source: Governor Scott's Executive Order, May 7, 1970, and Atlas of River Basins of the U. S., U. S. Department of Agriculture, Soil Conservation Service, Washington, D. C., 2nd Ed., June 1970.

# POPULATION

## TRENDS

The population increased 433,000 in the Tar-Neuse Study Area from 1940 to 1970, a 36 percent change. Population census for the study area show increases every ten years since 1940; however the increase was smaller at each enumeration. The increase in population for the next 30 years (1970 to 2000) is expected to be about 33 percent in the "C" Series estimate and 14 percent in the "E" Series estimate (Table 2).

Population growth has been steady in the Tar-Neuse Study Area (T-NSA) and for most of the Multi-County Planning Regions (M-C PR). The historical data of the M-C PR's in the study area show a progressive upward trend in population for M-C PR-J and P. Region J is a more industrial area while P is more agricultural, like K, L and Q; however, its growth stems largely from national defense and its ancillary activities. Regions K, L, and Q in comparison have not had the dramatic change in population as J and P. Trends in population growth for the future are expected to continue upward (Figures 3 and 4).

## PROJECTIONS

The population is expected to be greater at each future point in time to 2020 and to be greater in all areas; the multi-county planning areas, the study area, the hydrologic area and the state area. Although the 1940 to 1970 decennial increases in population have gotten smaller, the projections anticipate larger increases.

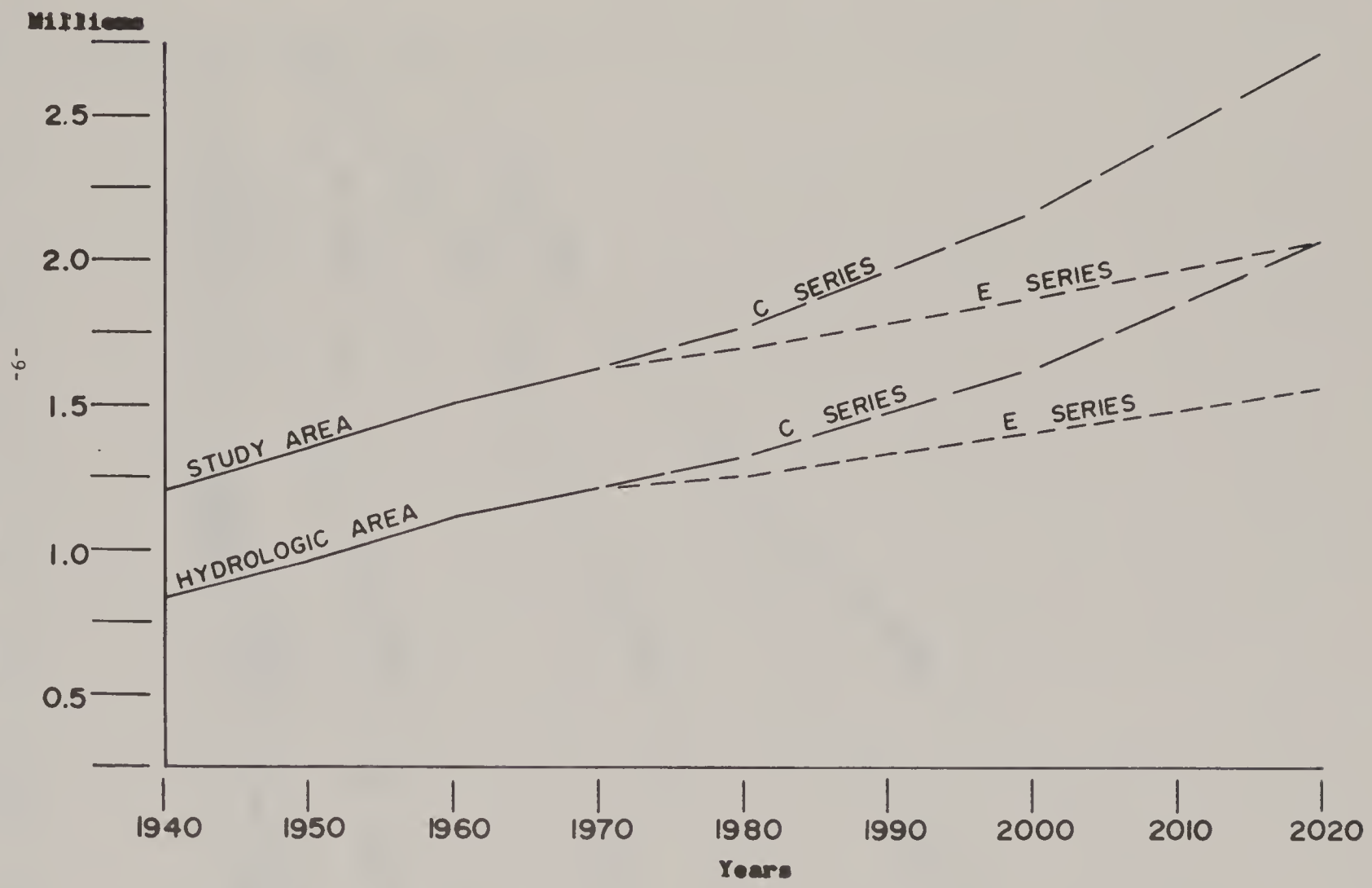
Table 2 - Population, historic and projected, by Region, Tar-Neuse River Basin Study, North Carolina, selected years

| Region | Historic | | | | Projected (000) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | "C" Series 1/ | | | "E" Series 1/ | | |
| | 1940 | 1950 | 1960 | 1970 | 1980 | 2000 | 2020 | 1980 | 2000 | 2020 |
| Multi-County Planning Region | -Number- | | | | -000- | | | | | |
| J | 320,127 | 387,344 | 440,329 | 540,599 | 608 | 792 | 1,054 | 580 | 681 | 788 |
| K | 137,861 | 143,135 | 139,913 | 133,997 | 143 | 179 | 226 | 136 | 154 | 169 |
| L | 239,800 | 252,868 | 258,711 | 246,842 | 263 | 309 | 388 | 250 | 265 | 290 |
| P | 245,979 | 304,244 | 387,620 | 410,123 | 455 | 520 | 580 | 434 | 447 | 460 |
| Q | 169,339 | 176,753 | 180,163 | 178,667 | 177 | 209 | 258 | 169 | 179 | 193 |
| Hydrologic Residual | 91,869 | 106,759 | 115,438 | 127,749 | 138 | 172 | 223 | 131 | 148 | 167 |
| Study Area | 1,204,975 | 1,371,103 | 1,522,174 | 1,637,977 | 1,784 | 2,181 | 2,729 | 1,700 | 1,874 | 2,067 |
| Hydrologic Area | 849,000 | 986,300 | 1,116,700 | 1,211,100 | 1,329 | 1,640 | 2,066 | 1,266 | 1,409 | 1,565 |
| North Carolina | 3,571,623 | 4,061,929 | 4,556,155 | 5,082,059 | 5,713 | 7,321 | 9,537 | 5,444 | 6,289 | 7,123 |

1/ The two sets of population projects shown assume different fertility rates by the year 2000. The "C" Series assumes a fertility rate of 2,777 births per 1,000 women. The "E" Series assumes a rate of 2,110 births per 1,000 women.

Source: Population data were developed from U. S. Census of Population; OBERS Projections, U. S. Water Resource Council; North Carolina Social Science Advisory Committee; and North Carolina Department of Administration, Office of State Planning. Data Derived by: Economic Research Service, Raleigh, N. C., November 1973

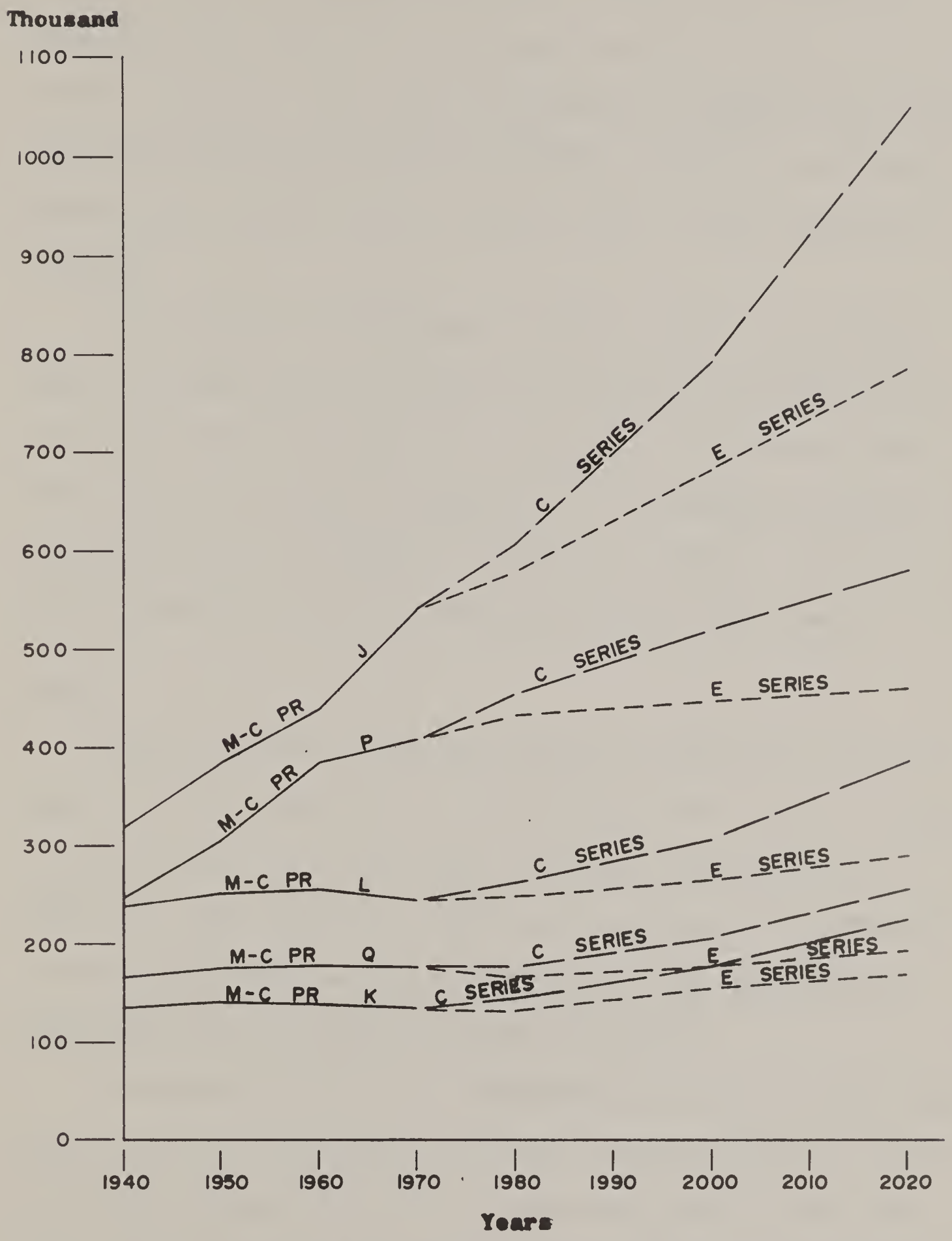
Population historic and projected Tar-Neuse Study Area and Hydrologic Area, North Carolina, years selected




SOURCE: Derived by ERS, Raleigh, from U. S. Department of Commerce, Bureau of Census, U. S. Census of Population; U. S. Water Resource Council, 1972 OBERS Projections, Vol. 3, North Carolina Social Science Advisory Committee and North Carolina Department of Administration, Office of State Planning

FIGURE 3

Population historic and projected by Multi-County Planning Region (M-CPR), Tar-Neuse River Basin Study, North Carolina, years selected




SOURCE: Derived by ERS, Raleigh, from U. S. Department of Commerce, Bureau of Census, U. S. Census of Population; U. S. Water Resource Council, 1972 OBERS Projections, Vol. 3; North Carolina Social Science Advisory Committee and North Carolina Department of Administration, Office of State Planning.

FIGURE 4

Two population estimates were prepared and are referred to as the "C" and "E" Series Projections. The "C" and "E" Series estimates stem from different assumptions of fertility for the future. Figures 3 and 4 show the effects of varying the fertility rates when making population projections. Currently, some demographers feel the "E" Series estimates will be more appropriate by 2000.

Multi-County Planning Region J is expected to contain more people and grow faster than the other regions in the study area. Increased industrial activities in the region will likely stimulate the expected growth in population. The expected reduction in military force will dampen population in Region P, while K, L, and Q's growth will likely accelerate over the recent past.

BIRTHS

Births decreased and deaths increased in the study area between the 1950's and 1960's. In the 1950's, there were 3.4 births for each death, but in the 1960's the ratio declined 2.5 to 1. (Table 3). The birth rate in the study area has been sufficient to offset the increased number of deaths and the out-migration permitting small increases in population growth.

A comparison of the North Carolina and the United States birth rates was made, using data from census periods beginning in 1920, to evaluate the use of the "C" series projections for the study area. There has been a general downward trend in birth rates in

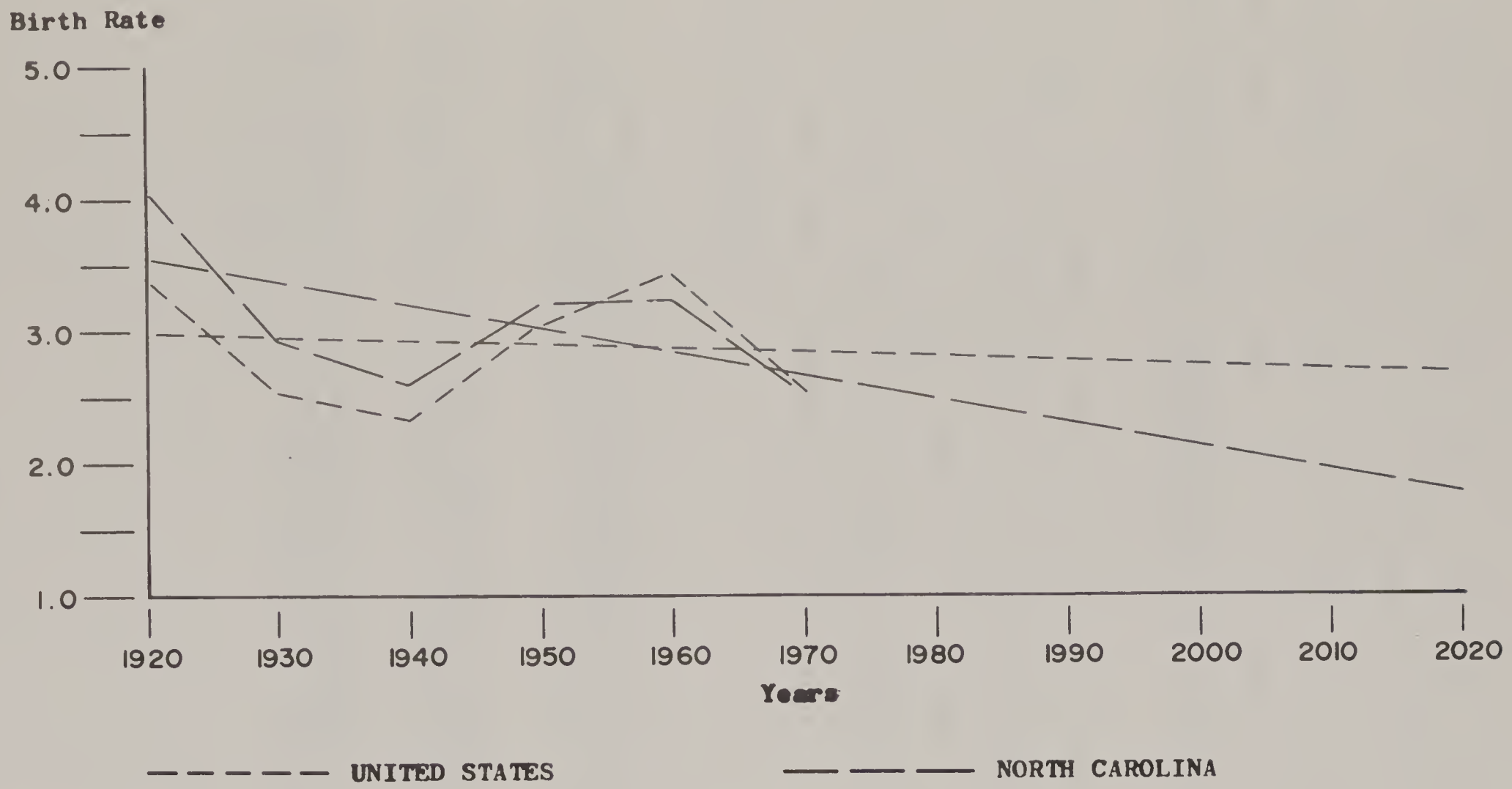
Table 3 - Births and deaths by Region, Tar-Neuse River Basin Study, North Carolina, selected years

| Region | 1950 - 1960 | | 1960 - 1970 | |
|---|---|---|---|---|
| | Births | Deaths | Births | Deaths |
| | Number | | | |
| Multi-County Planning Regions | | | | |
| J | 101,808 | 31,640 | 97,693 | 40,052 |
| K | 38,556 | 12,219 | 27,663 | 13,375 |
| L | 75,872 | 22,932 | 54,890 | 24,909 |
| P | 108,533 | 26,135 | 98,663 | 30,202 |
| Q | 53,563 | 15,760 | 36,698 | 17,208 |
| Hydrologic Residual | 29,315 | 10,765 | 23,951 | 12,507 |
| Study Area | 407,647 | 119,451 | 339,558 | 138,253 |
| Births to Deaths Ratio | 3.4 | | 2.5 | |
| North Carolina | 1,156,150 | 333,937 | 1,011,772 | 412,502 |
| Births to Deaths Ratio | 3.5 | | 2.5 | |

Source: Adapted by ERS from Population Change for North Carolina and North Carolina Counties, 1950-60 and 1960-70, Estimate of Out-Migration and Natural Increase , Clifford, W. B., and A. Clark Davis, Department of Sociology and Anthropology, Progress Report Soc. 54, 1971, N. C. State University, Raleigh.

North Carolina and in the United States. The North Carolina trend follows closely that for the United States. Figure 5 depicts the data of Table 4 showing that a straight line through the average numbers of births per woman since 1920 produces a sloping line downward

Birth Rates with a fitted straight line, North Carolina and United States, years selected




SOURCE: Derived by ERS, Raleigh, from U. S. Department of Commerce, Bureau of Census, Census of Population and North Carolina Public Health Department, 1960 Report, Part 2, Raleigh.

FIGURE 5

Table 4 - Total births per woman in the childbearing years, North Carolina and United States, selected years

| Area | 1920 | 1930 | 1940 | 1950 | 1960 | 1970 | 2020 |
|---|---|---|---|---|---|---|---|
| | Number | | | | | | |
| North Carolina | 4.11 | 2.98 | 2.61 | 3.22 | 3.29 | 2.53 | 2.13 |
| United States | 3:42 | 2.98 | 2.61 | 3.08 | 3.46 | 2.55 | 2.75 |

Source: Derived by ERS, Raleigh-November 1973, from U. S. Census and N. C. Public Health Department

to the right. An estimate from the fitted line through the data for North Carolina for 2000 would be 2.13 births per woman which is, coincidentally, quite close to the 2.11[1/2/] assumed for the United States "E" Series. This is not to imply an association of birth rates with time, but the straight line does provide a rough indication of direction[3/].

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1/ U. S. Bureau of Census Current Population Report Series, p 25, No. 493, Projections of the Population of the United States by Age and Sex, 1972 to 2020 , U. S. Government Printing Office, Washington, D. C., 1972.

2/ The 1972 Survey of Economic Opportunity reports that all women 18-24 years old can be expected to complete childbearing with an average of about 2.1 births, U. S. Bureau of Census, op cit p 2.

3/ North Carolina birth rates generally converge from above with the United States rates over the period. They have followed the United States trend in the past and are expected to continue to do so in the future.

In light of the close comparison of the North Carolina and the United States trend and direction in births, it was decided to also prepare estimates of projected population using the "E" Series assumption. The national OBERS Projections[1/] were developed in mid-1969 when a decision was made to use the "C" Series assumption. As a result, two levels of population projections were developed using different birth rate assumptions.

MIGRATION

In most times and places "economic opportunity" has been a fundamental influence behind the mobility of people[2/]; for example, the westward migration of homesteaders in the United States and North Carolinians out-migration from the Tar-Neuse Study Area.

Between 1950 and 1960, 137,000 people migrated out of the Tar-Neuse Study Area, amounting to 10 percent of the 1950 population of the study area and 42 percent of all of the people leaving the state of North Carolina (Table 5). Out-migration represents a net estimate leaving the area after accounting for those that entered.

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1/ U. S. Water Resource Council, OBERS Projections, Economic Activity in the U. S. , Vol. 3, U. S. Government Printing Office, Washington, D. C., September 1972.

2/ Bogue, Donald Jr., Henry S. Shryok and Siegried A. Howermann, Subregional Migration in the U. S., 1935-40. Concluded, "One of the most important factors in the migration is the difference in employment opportunities between the place of origin and the place of destination. People tend to migrate from areas having few opportunities to those having them in great abundance."

Table 5 - Natural increase and net-migration components of population change by Region, Tar-Neuse River Basin Study, North Carolina selected years

| Region | 50-60 Natural Increase | 60-70 Natural Increase | 50-60 Net-Migration | | 60-70 Net-Migration | |
|---|---|---|---|---|---|---|
| M-C PR | Number | Number | Number | Rate[1/] | Number | Rate[1/] |
| J | 70,168 | 57,641 | - 17,183 | - 4.4 | +42,629 | + 9.7 |
| K | 26,337 | 14,288 | - 29,559 | -20.7 | -20,204 | -14.4 |
| L | 52,940 | 29,981 | - 47,097 | -18.6 | -41,850 | -16.2 |
| P | 82,398 | 68,461 | + 978 | + 0.3 | -45,958 | -11.9 |
| Q | 37,803 | 19,490 | - 34,393 | -19.5 | -20,986 | -11.6 |
| Hydrologic Residual | 18,550 | 11,444 | - 9,871 | - 9.2 | - 867 | - 0.7 |
| Study Area | 288,196 | 201,305 | -137,125 | -10.0 | -87,236 | - 5.6 |
| North Carolina | 822,213 | 599,270 | -327,987 | - 8.1 | -73,366 | - 1.6 |

1/ Rate of net-migration is calculated by dividing net-migration by the population of the beginning year; e.g. - 17,183 (people leaving) ÷ 387,344 (population for M-C PR J, Table 2, in 1950) = 4.4 percent.

Source: Ibid, Table 3.

The out-migration appears to have slowed in the Tar-Neuse Study Area during the decade of the 1960's. In this period, 87,000 people left the study area (Table 5). In a 1965 study[1/], which included labor force migration, 23 percent of the labor force went north, 8 percent went west and 69 percent moved within the southeast region for jobs. This movement was out of the Coastal Plains region of North Carolina, South Carolina and Georgia. Although not specific to the Tar-Neuse Study Area, the 1965 study does give some indication of movement and direction as the study area is almost wholly in the Coastal Plains of North Carolina

1/ Floyd, Charles, R. James Heyl, and James A. Barnes for the Coastal Plains Regional Commission, Economic Profiles of the Coastal Plains Regions , University of Georgia, January 1970.

Society's mobility is mainly a response to economic opportunity, and this inter-area mobility[1/] is a major problem in preparing population projections. The current North Carolina State policy[2/] is to try and stem the out-migration by encouraging industries that will pay better salaries to develop in North Carolina.

## DISTRIBUTION

Where people are, in terms of time, and space is paramount in their effect as producing and consuming units. Centers of population are a result of opportunities for employment. In the past decades major inter-regional migrations have shifted the centers of population. It is important in planning the conservation, use and management of natural resources to know: (1) where the population centers are; (2) the densities at these centers; and (3) their possible shifts.

Centers: There were only two cities (Raleigh and Durham) with populations over 100,000 in the Tar-Neuse Study Area in 1970. The remaining cities and towns are medium to small in size and range in population from 10-50,000. There were no cities in the study area that fell in the 50,000 to 100,000 category (Table 6).

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1/ For a clear presentation of migration data and interpretation problems see: Buford, Roger L., 'Net Migration for Southern Counties, 1940-50, 1950-60 , Research Paper No. 24, Georgia State College, Atlanta, January 1963.

2/ Personal communications with H. A. Poole, Assistant Director, Division of Commerce and Industry, State of North Carolina, Department of Natural and Economic Resources, Raleigh, June 25, 1973.

Table 6 - Major centers of population, their county and Multi-County Planning Region location and population, Tar-Neuse River Basin Study, North Carolina, 1970

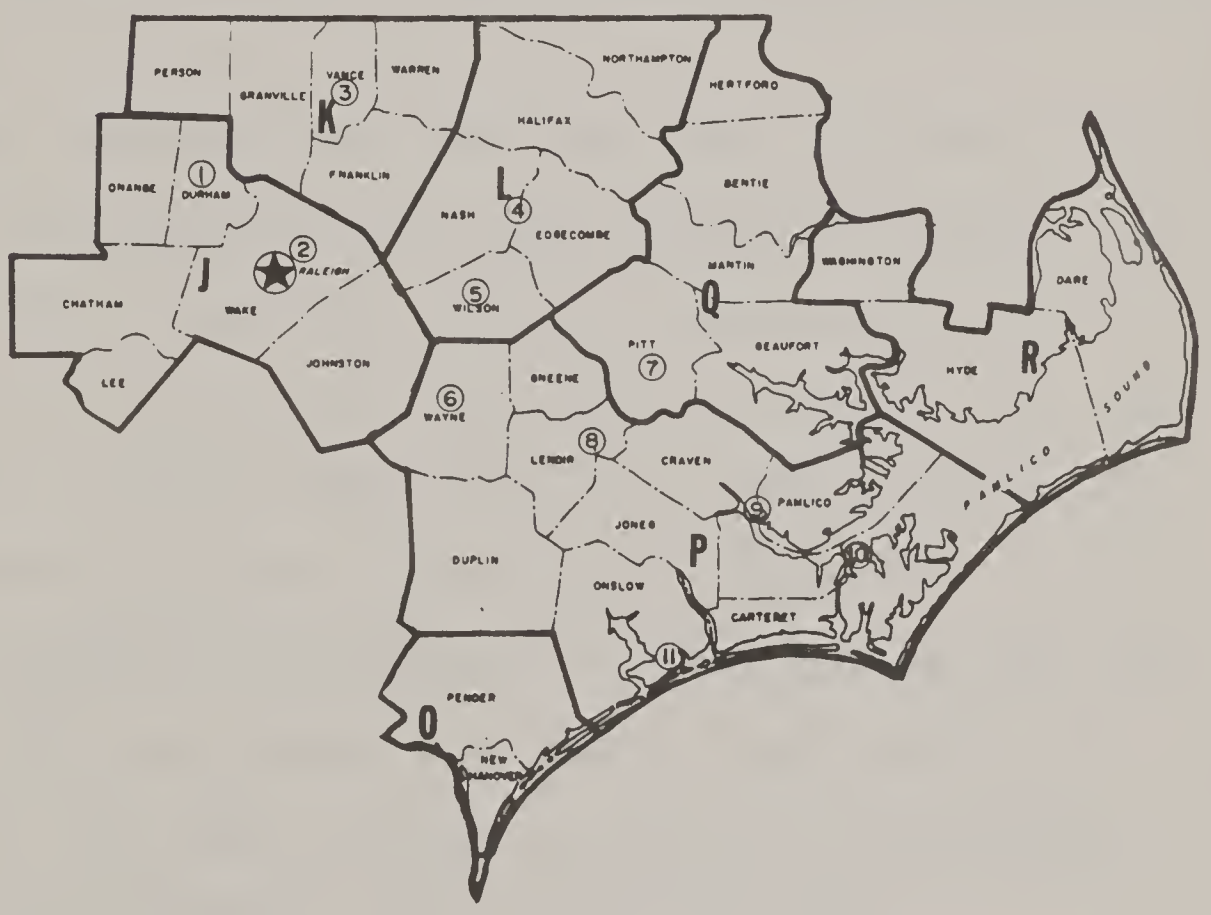
| Location | | | | Population |
|---|---|---|---|---|
| Multi-County Planning Region | County | Center | | |
| | | | | 100,000 - 109,999 |
| J | Wake | Raleigh | (2) | 106,753 |
| J | Durham | Durham | (1) | 100,630 |
| | | | | 50,000 - 99,999 |
| | | | | None |
| | | | | 25,000 - 49,999 |
| P | Onslow | Camp LeJeune | (11) | 34,549 |
| L | Nash-Edgecombe | Rocky Mount | (4) | 34,284 |
| L | Wilson | Wilson | (5) | 29,347 |
| Q | Pitt | Greenville | (7) | 29,063 |
| P | Wayne | Goldsboro | (6) | 26,810 |
| | | | | 10,000 - 24,999 |
| P | Lenoir | Kinston | (8) | 23,020 |
| P | Craven | New Bern | (8)9 | 14,660 |
| K | Vance | Henderson | (3) | 13,896 |
| P | Craven | Cherry Point | (8)12 | 12,029 |
| | | Total | | 425,041 |

Source: U. S. Census of Population, Bureau of Census

The eleven major centers of population listed in Table 6, and located on Figure 6, contain 425,000 people; about 35 percent of the people in the Tar-Neuse hydrologic area. Of the 425,000, approximately half of the people are in Raleigh and Durham, North

# Centers of population within the hydrologic area and population densities by Region, Tar-Neuse River Basin Study, North Carolina, years selected

| POPULATION DENSITIES PER SQUARE MILE | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | REGIONS | | | | | | | | |
| YEAR | J | K | L | P | Q | O/R | T-NSA | NC | US |
| 1950 | 117 | 67 | 94 | 63 | 59 | 44 | 74 | 83 | 43 |
| 1960 | 133 | 66 | 96 | 80 | 60 | 48 | 83 | 93 | 50 |
| 1970 | 163 | 63 | 92 | 84 | 59 | 53 | 89 | 104 | 57 |




SOURCE: Derived by ERS, Raleigh, from U. S. Department of Commerce, Bureau of Census, U. S. Census of Population, Washington, D. C.

FIGURE 6

Carolina. There appears to be no uniformity in the distribution of the centers within the basin. However, from the 1970 census, the cities and towns become smaller as you proceed from the Piedmont through the Coastal Plain to the Atlantic shore.

Density: With the largest cities located in the headwaters of the basin, one would expect the density, people per square mile, to be the greatest there. This is the case. The M-C PR with the greatest number of people per square mile is J (Figure 6). In 1970, M-C PR J's population per square miles was 57 percent greater than that for the state and almost two times that of the U. S. The other planning regions are about one-half as densely populated as Region J.

Shifts: Populated areas shift over time. In 1790 the U. S. population was centered 23 miles east of Baltimore, Maryland; in 1970 the center of population had shifted 700 miles west and 60 miles south to a point in St. Clair County, Illinois[1/]. The population center in the Tar-Neuse Study Area in 1940 was within the two-mile vicinity of Wilson, North Carolina (Figure 6). In 1970, the center had shifted approximately six miles west and nine miles south to a point just northeast of Fremont, North Carolina, in Wayne County. The shift is likely in response to the industrialization in the headwaters area of the river basin.

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1/ Bureau of Census, Statistical Abstract of the U. S., U. S. Government Printing Office, 1971, p 7.

The national shift in population has been west at a rate of about four miles per year and south at about 0.3 miles. In comparison, the Tar-Neuse population is shifting west at a rate of 0.2 miles per year and south at about the same rate as the nation. For the nation, at least in the past, it would appear that employment opportunities were more west than south. However, for the Tar-Neuse Study Area, they were more south than west. The removal of the defense establishment influence would have further concentrated the population in M-C PR J and would shift the center of the Tar-Neuse population into that region. With a continuance of this westward shift, the more populated centers will be in the headwaters of the river basin. Water supply and water quality will most likely be resource problems in M-C PR J.

Urbanization: We want to know about the status of urbanization because of the water and land problems associated with urban living. Some urban area problems are congestion, sprawl, water supply and pollution; and they are problems that resource planning can help to solve. The population descriptions customarily used to express the location of living are urban and rural.

Multi-County Planning Region (M-C PR) J had the largest part of its population in urban areas in 1970, and M-C PR K had the largest part of its population in rural areas (Table 7). The large rural non-farm population appears to be in those regions where the farm population is the largest; i.e., M-C PR K, Q, and L.

Table 7 - Place of residence, urban, rural farm, and non-farm by Region, Tar-Neuse River Basin Study, North Carolina, 1970

| Region | Urban | Rural Farm | Rural Non-Farm |
|---|---|---|---|
| | ---------- | Percent | ---------- |
| Multi-County Planning Region | | | |
| J | 59.1 | 8.3 | 32.6 |
| K | 24.6 | 24.8 | 50.6 |
| L | 37.6 | 16.5 | 45.9 |
| P | 42.1 | 12.1 | 45.8 |
| Q | 34.2 | 18.0 | 47.8 |
| Hydrologic Residual | 48.9 | 8.4 | 42.7 |
| Tar-Neuse Study Area | 45.3 | 12.9 | 41.8 |
| North Carolina | 45.0 | 10.4 | 44.6 |
| United States | 73.5 | 4.8 | 21.7 |

Source: U. S. Bureau of Census of Population

For the most part a consistent pattern of change in the place of residence appeared in the decades of the 1950's and 1960's. The urban proportion of the population increased while the rural farm part decreased in all regions (Table 8). In Regions K, L, and Q, the rural non-farm areas have been growing faster than the other regions and may cause peculiar water supply and on-site septic problems.

The study area has urbanized at an increased rate of 8.6 percent in the 1960's, as compared to 4.7 percent in the 1950's; while at the state level there was little or no change. In contrast, people were leaving the central cities for the suburbs in the United States.

Table 8 - Change in the place of residence, urban, rural farm, and non-farm by Region, Tar-Neuse River Basin Study, North Carolina 1950-60, 1960-70

| Region | 1950 - 1960 | | | 1960 - 1970 | | |
|---|---|---|---|---|---|---|
| | | Rural | | | Rural | |
| | Urban | Farm | Non-Farm | Urban | Farm | Non-Farm |
| | Percent | | | | | |
| Multi-County Planning Region | | | | | | |
| J | +7.6 | -12.8 | + 5.2 | + 6.1 | - 6.7 | + 0.6 |
| K | +2.7 | -16.0 | +13.3 | + 4.8 | -16.5 | +11.7 |
| L | +5.4 | -15.3 | + 9.9 | + 3.4 | -15.6 | +12.2 |
| P | +1.0 | -18.0 | -17.0 | +16.3 | - 9.0 | - 7.3 |
| Q | +7.1 | -16.6 | + 9.5 | + 4.2 | -15.2 | +11.0 |
| Hydrologic Residual | +0.5 | - 9.7 | + 9.2 | + 4.2 | - 0.7 | - 1.3 |
| Tar-Neuse Study Area | +4.7 | -15.5 | +10.8 | + 8.6 | -10.7 | + 2.1 |
| North Carolina | +5.9 | -16.2 | +10.3 | + 5.4 | - 7.3 | + 1.9 |
| United States | +5.9 | - 6.6 | + 0.7 | + 3.6 | - 3.9 | + 0.3 |

Source: U. S. Bureau of Census, Census of Population

CHARACTERISTICS

People are a part of the economic base of a region. Their age, health, education and welfare characterize this resource. These parameters give some indication to planners for the proper conservation, management and use of the labor part of the economic base.

Age: The distribution of the population in the various age groups is important because of the kinds of market demands that

relate to different periods in a person's life. Young people have wants and needs that are different from their elders. Therefore, some understanding of the age distribution and general age of the public is useful in evaluating supply and demand.

The population by age groups in the study area and North Carolina was quite different from that in the United States in 1940. This difference almost disappeared by 1970, when the age structure for the study area and North Carolina became much like that of the United States (Table 9). The age distribution of the population for the Tar-Neuse Study Area and North Carolina closely follow the United States' trend (Figure 7). The percent of the population in the less-than 15 years group and the 15 to 64-year group has increased and decreased during the period of 1940 to 1970. However, the 65-year-old and older group has increased at each census period in all areas.

Because of the lower birth rate expected in the future, the less than 15-year-old group is likely to decline in the short run, and the 15 to 64 group will probably continue to increase as out-migration becomes less of a factor. The 65 and older people will likely grow as a result of generally better living conditions and health programs that make health services more available to older people, specifically, and everyone in general. The net effect is likely to be an increase in the age of the population of the Tar-Neuse Study Area.

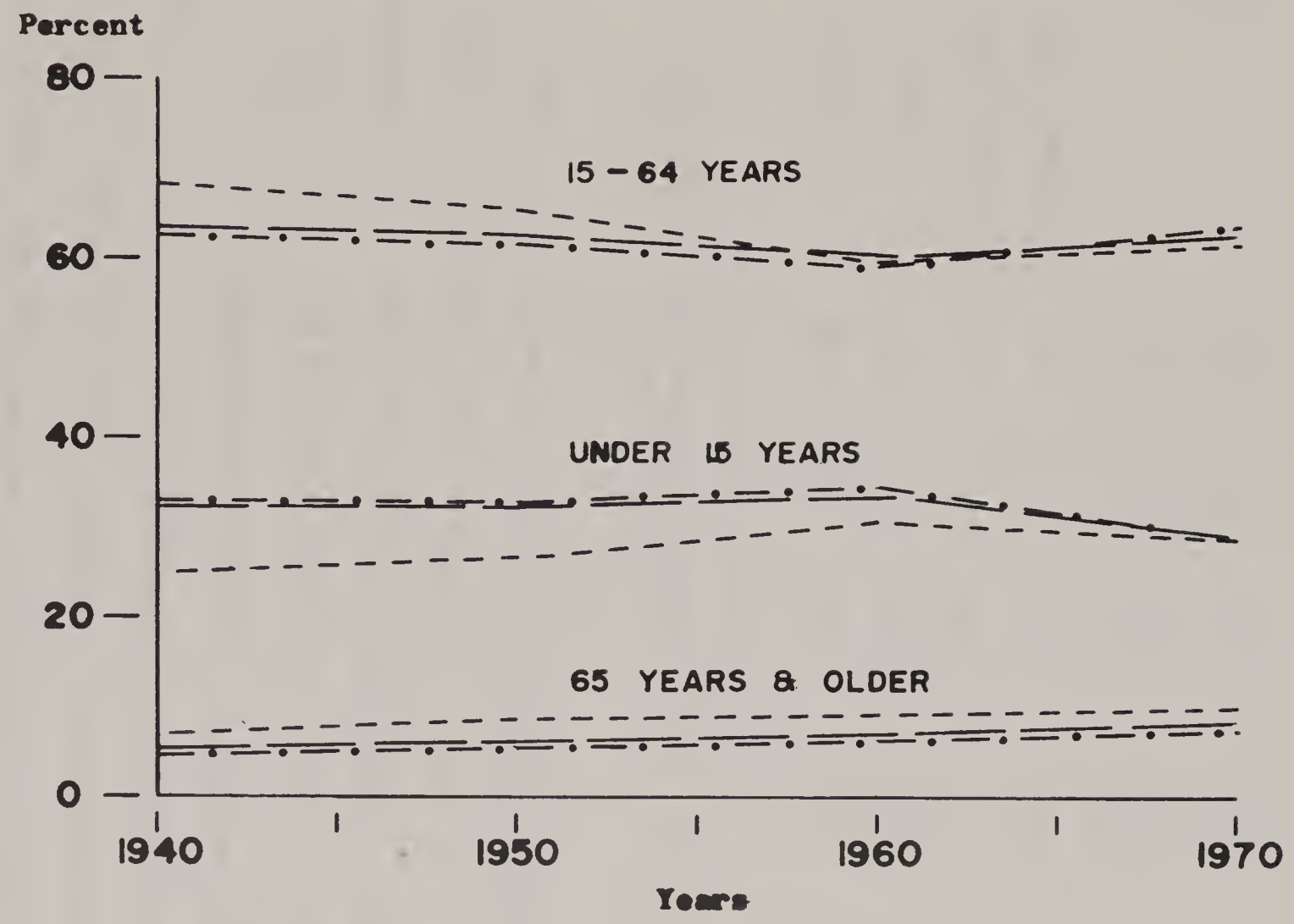
Table 9 - Percent of population by age groups and Region, Tar-Neuse River Basin Study, North Carolina, selected years

| Age Group - Region | 1940 | 1950 | 1960 | 1970 |
|---|---|---|---|---|
| | Percent | | | |
| Less than 15 years | | | | |
| Tar-Neuse Study Area | 32.9 | 32.9 | 34.3 | 28.7 |
| North Carolina | 32.5 | 32.3 | 33.4 | 28.6 |
| United States | 25.0 | 26.9 | 31.1 | 28.5 |
| 15-64 years | | | | |
| Tar-Neuse Study Area | 62.8 | 61.7 | 59.3 | 63.6 |
| North Carolina | 63.1 | 62.2 | 60.0 | 63.3 |
| United States | 68.1 | 65.0 | 59.7 | 61.6 |
| 65 years and older | | | | |
| Tar-Neuse Study Area | 4.3 | 5.3 | 6.5 | 7.8 |
| North Carolina | 4.4 | 5.5 | 6.8 | 8.1 |
| United States | 6.8 | 8.1 | 9.2 | 9.9 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 |

Source: Bureau of Census, Census of Population

There is a slight upward trend in median age in the study area as well as in the state which is in contrast to the downward trend in the United States (Table 10). For the 1960's, the median age

Percent of population by age groups and Region, Tar-Neuse River Basin Study, North Carolina, years selected




SOURC : U. S. Department of Commerce, Bureau of Census, Census of Population, Washington, D. C.

FIGURE 7

Table 10 - Median age and change by Region, Tar-Neuse River Basin Study, North Carolina, selected years

| Region | 1950 | 1960 | 1970 | Change 1950-60 | Change 1960-70 |
|---|---|---|---|---|---|
| | Age | | | Percent | |
| Multi-County Planning Region | | | | | |
| J | 25.6 | 26.3 | 26.2 | +0.7 | -0.1 |
| K | 23.5 | 24.6 | 27.6 | +1.1 | +3.0 |
| L | 22.9 | 23.0 | 26.0 | +0.1 | +3.0 |
| P | 23.7 | 23.0 | 24.4 | -0.7 | +1.4 |
| Q | 22.8 | 23.0 | 25.9 | +0.2 | +2.9 |
| Hydrologic Residual | 26.7 | 27.3 | 27.8 | +0.6 | +0.5 |
| Tar-Neuse Study Area | 24.2 | 27.1 | 25.9 | +2.9 | -1.2 |
| North Carolina | 25.0 | 25.5 | 26.5 | +0.5 | +1.0 |
| United States | 30.2 | 29.5 | 28.3 | -0.7 | -1.2 |

Source: Derived by ERS, Raleigh, November 1973, from Census of Population, Bureau of Census

in the study area declined as it did in the United States. This was probably a response to the in-migration in M-C PR J.

Health: The health services in a region give a rough approximation of the health and physical condition of the people. This assumes that the residents have access to the services that are available. The health services discussed in this section represent the customary services generally available. Omitted are geriatric care facilities, long-term patient institutions and health services associated with large governmental installation, such as found on military bases.

Health services in both the study area and North Carolina are somewhat below the average for the nation, using standard ratios of population per care (Table 11). The health care/services in the study area are about the same as are available in the state, however there is wide variation among regions and much more variation among counties. Multi-County Planning Region J leads in the number of available services, as Duke Medical Center is located in this region at Durham. Multi-County Planning Region P offers the fewest services among the regions; this, however, is not quite precise as the military health services have not been considered, while the military population has been counted in the population. All 35 counties in the study area had at least one doctor for patient care in 1971. The number of doctors per county ranged from one in Pamlico to 646 in Durham.

The most populated region, M-C PR J, had the most doctors, hospital beds, dentists, active registered nurses and practical nurses. Generally doctors, dentists and nurses locate where there are good medical facilities, equipment, supportive services, and personnel available. Other factors considered in practice location are population and income.

Education: Educational attainment level and training directly affect the capability and capacity of the labor force to produce and be effective. A higher level of education usually means better paying jobs, which can improve the well-being of society and strengthen the economy in general.

Table 11 - Physicians, hospitals, hospital beds, dentists, and nurses, by Region, Tar-Neuse River Basin Study, North Carolina selected years

| Region | Physicians 1/ | Population Per Physican | Hospitals 1/ | Population Per Hospital | Hospital Beds 1/ | Population Per Bed | Dentists 1/ | Population Per Dentist | Nurses 1/ AR 2/ | Population Per Nurse AR | Nurses 1/ ARP 3/ | Population Per Nurse ARP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Number | | | | | | | | | | | |
| Multi-County Planning Region | | | | | | | | | | | | |
| J | 1,296 | 417 | 13 | 41,585 | 2,871 | 188 | 301 | 1,796 | 2,794 | 193 | 1,562 | 346 |
| K | 70 | 1,914 | 5 | 26,799 | 383 | 350 | 32 | 4,187 | 239 | 561 | 178 | 753 |
| L | 164 | 1,505 | 8 | 30,855 | 759 | 325 | 61 | 4,047 | 637 | 388 | 333 | 741 |
| P | 218 | 1,881 | 8 | 51,265 | 963 | 426 | 89 | 4,608 | 823 | 498 | 691 | 594 |
| Q | 125 | 1,429 | 7 | 25,524 | 607 | 294 | 41 | 4,358 | 400 | 447 | 259 | 690 |
| Hydrologic Residual | 117 | 1,092 | 4 | 31,937 | 477 | 268 | 38 | 3,362 | 481 | 266 | 156 | 819 |
| Tar-Neuse Study Area | 1,990 | 823 | 45 | 36,399 | 6,060 | 270 | 562 | 2,915 | 5,374 | 305 | 3,179 | 515 |
| North Carolina | 4,762 | 1,067 | 134 | 37,926 | 18,725 | 271 | 1,625 | 3,127 | 15,698 | 324 | 8,205 | 619 |
| United States | 263,730 | 777 | 5,749 | 35,637 | 849,640 | 241 | 116,964 | 1,752 | 700,000 | 293 | 257,900 | 794 |

1/ The information is from surveys dated as follows: Physicians, Hospitals and Hospital Beds - December 31, 1971
Dentists, July 1969, and Nurses, December 31, 1970
The ratios were calculated using 1970 population census. See Table 2 of this report.
2/ Active Registered
3/ Active Registered Practical

Source: Derived by ERS, Raleigh, November 1973, from G. A. Roback Distribution of Physicans in the U. S. , 1971, American Medical Assoc., Chicago 1972; Bureau of Economic Rsearch Statistics, Distribution of Dentists in the U. S. , 1969, American Dental Assoc., Chicago, 1970; and North Carolina Bureau of Nursing, Facts About Registered Nurses and Licensed Practical Nurses , Raleigh, April 1972.

The educational level, by the usual indicators, is rising in the Tar-Neuse Study Area; however, the level is behind that of North Carolina and the United States. In the study area in 1960 3.5 percent, 26,217 people over 24 years of age had no schooling; but by 1970 the number with no schooling had declined to 2.4 percent, 19,485 persons. (Table 12 and internal data of the Economic Research Service.) The number completing over three years of college work was 50,854 (6.9 percent of those over 24 years in 1960). By 1970, 79,074 had completed that much college work (9.6 percent). Multi-County Planning Region J has the largest proportion of its people schooled when compared to the other regions in the study area; while K and L have the lowest.

What are the implications for the study area and the regions therein? Assuming the better trained and educated people do not out-migrate and industry comes into the study area providing "suitable" jobs, one can be somewhat optimistic from an economic point of view. Better trained and educated people are of greater value to industry and society. As more people are schooled and trained at higher levels (a form of local subsidy to industry), industry will have to spend less in their training programs, and North Carolina will become more attractive as a place to locate and invest.

Welfare: Poverty conditions prevent the full expression and development of people and hamper their effective participation in the labor force and other aspects of life. The poor contribute

Table 12 - Percent of persons over 24 years old completing over three years of college, four years of high school, eight years of elementary school, and no schooling by Region, Tar-Neuse River Basin Study, North Carolina, 1960 and 1970

| Region | Population Over 24 Years | | Over 3 Years College | | 4 Years High School | | 8 Years Elementary School | | No Schooling | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1960 | 1970 | 1960 | 1970 | 1960 | 1970 | 1960 | 1970 | 1960 | 1970 |
| | Percent | | | | | | | | | |
| Multi-County Planning Region | | | | | | | | | | |
| J | 51.6 | 51.3 | 10.9 | 15.4 | 39.0 | 47.6 | 62.1 | 76.1 | 2.8 | 1.8 |
| K | 49.7 | 53.0 | 4.3 | 4.9 | 25.5 | 28.9 | 49.4 | 63.4 | 4.9 | 3.2 |
| L | 47.7 | 51.2 | 4.8 | 6.1 | 25.1 | 30.9 | 47.6 | 62.5 | 5.2 | 3.1 |
| P | 45.2 | 45.3 | 5.3 | 7.0 | 33.9 | 41.0 | 61.4 | 73.2 | 2.9 | 2.6 |
| Q | 47.5 | 50.4 | 5.4 | 7.5 | 26.7 | 36.3 | 50.2 | 64.7 | 4.0 | 2.7 |
| Hydrologic Residual | 52.6 | 53.7 | 5.5 | 8.0 | 33.1 | 43.5 | 62.4 | 76.6 | 2.7 | 1.7 |
| Tar-Neuse Study Area | 48.7 | 50.0 | 6.9 | 9.6 | 32.3 | 40.3 | 57.0 | 71.1 | 3.5 | 2.4 |
| North Carolina | 50.6 | 52.1 | 6.3 | 8.5 | 32.3 | 38.5 | 58.6 | 71.7 | 3.1 | 2.0 |
| United States | 55.5 | 54.1 | 7.7 | 10.7 | 41.1 | 52.3 | 77.8 | 84.5 | 2.3 | 1.6 |

Source: Derived by ERS, Raleigh, November 1973, from Census of Population, Bureau of Census

marginally to the welfare of the region and/or a nation and may actually undermine it. The welfare support of these people can be a significant drain on available resources.

In 1969, 5.5 million familes in the United States had incomes less than the poverty level [1/]; in North Carolina - 211,000, in the Tar-Neuse Study Area - 82,000,and these 82,000 families had a mean family income of $2,060. This income was $1,608 below the poverty level identified in the 1970 Census of Population for the study area. A larger proportion (20.5 percent) of the families in the study area are below the poverty level than in North Carolina (16.3 percent) or the United States (10.7 percent) (Table 13).

The welfare picture is not quite as bleak when one considers that income data do not reflect the real income condition of most rural residents. The income data does not adequately reflect: incidental sale of property; in-kind income, such as food produced, clothes made; "free" living quarters; money borrowed; exchange of money between relatives; etc. If a concern in resource planning is to improve the quality of life, then it would appear that improving the income levels of these 82,000 families should be a study objective.

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1/ A poverty definition originated in the Social Security Administration 1964. The index provides a range of poverty income cut offs adjusted by such factors as family size, sex of the family head, number of children under 18, and place of residence. For a detailed explanation of the poverty definition see U. S. Bureau of the census, Current Population Reports, Series, p 23. No. 28, Revision in Poverty Statistics 1959 to 1968.

Table 13 - Number of families, mean family income, poverty level, public assistance receivers by Region, Tar-Neuse River Basin Study, North Carolina, 1969

| Region | Families: All | | Families: Incomes Less Than Poverty | | Families: Receiving Public Assistance | Poverty: Level | Poverty: Families |
|---|---|---|---|---|---|---|---|
| | Number | Income 1/ | Number | Income 1/ | Percent | Dollars | Percent |
| Multi-County Planning Planning Region | | | | | | | |
| J | 134,205 | 9,857 | 18,590 | 2,066 | 19.0 | 3,568 | 13.9 |
| K | 31,997 | 7,537 | 7,920 | 2,121 | 18.5 | 3,730 | 24.8 |
| L | 59,791 | 7,319 | 15,919 | 2,136 | 17.7 | 3,840 | 26.6 |
| P | 96,309 | 7,690 | 21,380 | 2,032 | 15.2 | 3,595 | 22.2 |
| Q | 43,541 | 7,302 | 12,208 | 1,948 | 21.0 | 3,703 | 28.0 |
| Hydrologic Residual | 33,004 | 8,659 | 5,923 | 2,093 | 14.3 | 3,632 | 17.9 |
| Tar-Neuse Study Area | 398,847 | 8,389 | 81,940 | 2,060 | 17.7 | 3,668 | 20.5 |
| North Carolina | 1,292,466 | 8,872 | 211,222 | 2,030 | 15.8 | 3,558 | 16.3 |
| United States | 51,168,599 | 10,999 | 5,462,216 | 1,935 | 21.5 | 3,477 | 10.7 |

1/ Mean Family Income - This is the result of dividing total family income by the total number of families.

Source: Derived by ERS, Raleigh, November 1973, from Census of Population, General Social and Economic Characteristics, 1970, Bureau of Census.

## EMPLOYMENT

### UNEMPLOYMENT

Unemployment, as generally understood, is more than just being out of a job. Unemployment data do not include: (1) part-time workers, where full-time employment is not available, and (2) workers who have been unsuccessful and have dropped out of the labor force. The human resource structure of the economy is composed of: (1) working and non-working age groups; (2) total labor force; (3) military and civilian labor forces; (4) employment and unemployment of the civilian labor force; and (5) public and private employment of those employed. But, as can be seen from Figure 8[2/], unemployment estimates are a percent of the civilian labor force component of the total population. Similar information is shown in Table 14 for the study area to give a perspective of the employed to the unemployed.

Unemployment in the study area and in North Carolina is difficult to assess since employment surveys in North Carolina are taken at the place of work rather than at the place of residence as is done in estimating the national rates of unemployment[2/].

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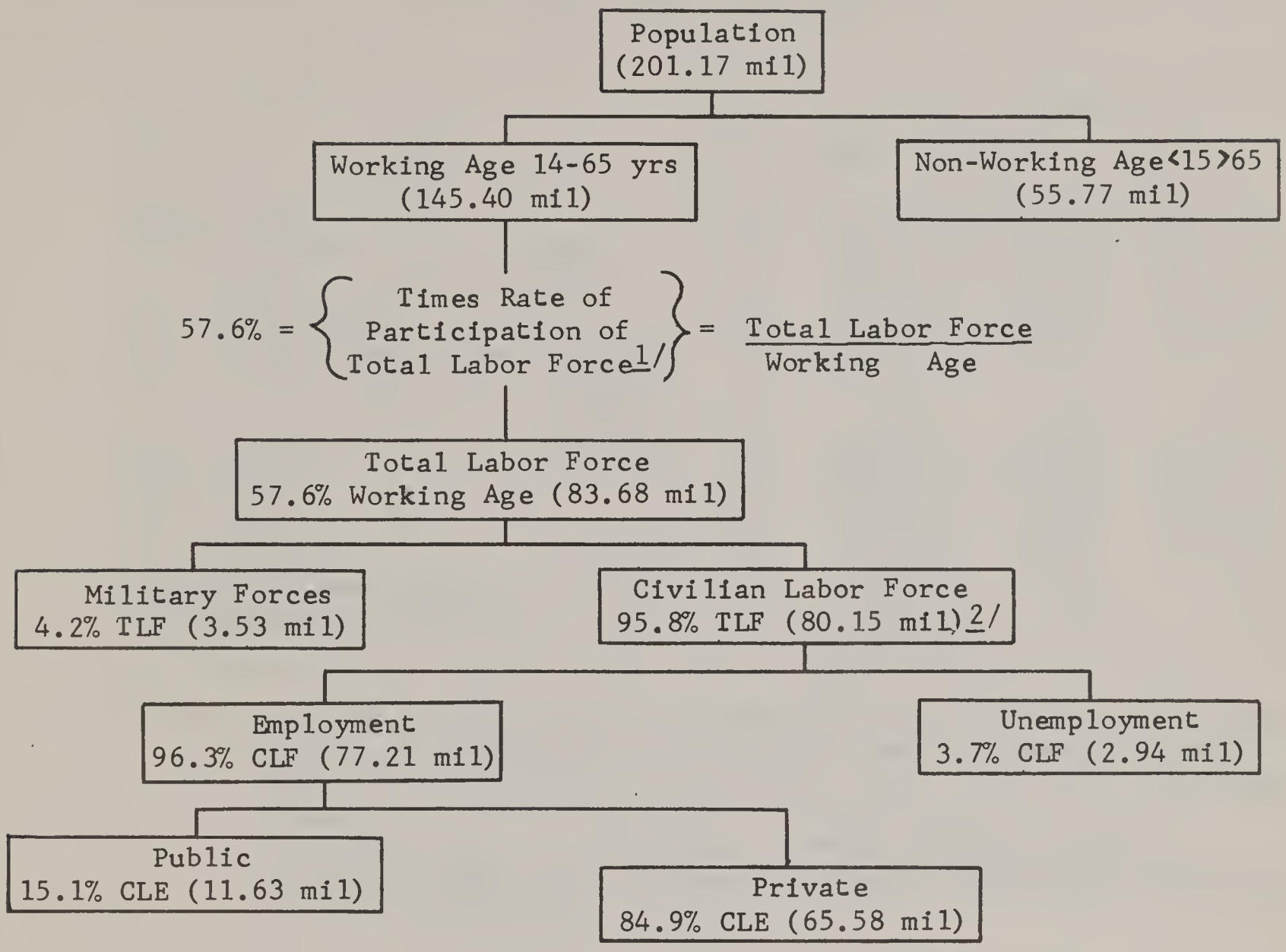
1/ Water Resource Council, OBERS Projections, Vol. 1, U. S. Government Printing Office, Washington, D. C., September, 1972.

2/ Beginning May, 1974, the Employment Security Commission of North Carolina labor force concept was changed from a count of jobs at the place of work to the place of residence, making it comparable to national data.

HUMAN RESOURCE STRUCTURE UNITED STATES 1968




1/ Considers assumptions about those inclined to seek employment and those who don't want to or can't physically.

2/ A 96 percent rate of civilian employment is the average assumed over the long run.

SOURCE: Derived by ERS, Raleigh, from U. S. Water Resource Council, OBERS Projections, Vol. 1, Washington, D. C., September 1972.

FIGURE 8

Table 14 - Human resource structure, Tar-Neuse River Basin Study, North Carolina 1950, 1960, and 1970

| Item | Unit | 1950 | 1960 | 1970 |
|---|---|---|---|---|
| Population | NR | 1,371,103 | 1,522,174 | 1,637,977 |
| (1) Non-Working 15 65 years | NR | 524,512 | 619,007 | 597,611 |
| (2) Working 15 to 65 years | NR | 846,591 | 903,167 | 1,040,366 |
| (3) Armed Forces | NR | 19,645 | 42,417 | 52,690 |
| (4) Civilian Labor Force :(6)+(9) | NR | 484,217 | 515,768 | 571,720 |
| (5) Participation Rate :$\frac{(3)+(4)}{(2)}$ | % | 59.5 | 61.8 | 60.0 |
| (6) Employed :(7)+(8) | NR | 465,819 | 489,059 | 540,760 |
| (7) Public | NR | 16,035 | 21,421 | 30,896 |
| (8) Private | NR | 449,784 | 467,638 | 509,864 |
| (9) Unemployed :(4)-(6) | NR | 18,398 | 26,709 | 30,960 |
| (10) Unemployment Rate :(9)÷(4) | % | 3.8 | 5.2 | 5.4 |
| (11) Unemployment Rate-US | % | 5.3 | 5.5 | 4.9 |

Source: Derived by ERS, Raleigh, November 1973, from Bureau of Census, Census of Population; adopted from Lowell D. Ashby, "Growth Patterns in Employment by County", Vol. 5, Office of Business Economics, U. S. Department of Commerce; North Carolina Employment Security Commission, "Work Force Estimates", Raleigh, August 1972; Bureau of Census, "Statistical Abstract of the United States", 1971.

The study area estimates of unemployment would tend to be lower than the estimates for the United States, as a result of double job holders. There is some variation in unemployment among the M-C PR's, although not as much as among the counties. There was more unemployment in MC PR L and Q and less in J in 1972; at the same time, 1972 county estimates ranged from a high of 9.9 percent unemployment in Hyde County to 1.9 percent in Wake[1/]. The Manpower Administration, of the U. S. Department of Labor, classifies areas as to unemployment.

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1/ Employment Security Commission, North Carolina Work Force Estimates, Raleigh, October 1973.

In the July 1973 issue[1/] three counties in the study area were classified: Bertie--substantial unemployment[2/], Greene and Pender--persistent unemployment[3/].

For the entire study area, unemployment is above that for the state in 1972 (by about one percent). This might be expected in light of the ruralness of the study area and the general lack of large industrial centers. The relationship of unemployment of the study area to the United States is shown in Table 14. The general upward trend in the study area's unemployment, while the national unemployment rate has been generally downward, is due to the relatively more rural nature of the study area than the nation.

LABOR FORCE

The labor force is composed of military and civilian work forces. This classifications helps in the evaluation of the supply and demand of goods and services as the military and civilian markets are quite different.

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1/ Manpower Administration, U. S. Department of Labor, Area Trends, Washington, D. C., July 1973

2/ Areas of substantial unemployment are labor areas in which the current and anticipated local labor supply substantially exceeds labor requirements. When unemployment in the area equal to six percent or more of the work force is anticipated, that unemployment will remain six percent for the next two months.

3/ Areas of persistent unemployment are labor areas where unemployment during the most recent calender year has averaged six percent or more of the work force, as related to the national unemployment.

Military: The total labor force is composed of the working age population less those not inclined to work[1/] or can't physically. Military personnel are not considered as being employed, although they are in a sense employed to provide a service. We are concerned about the number of military personnel because of the demands they make on the natural resources and the markets and job opportunities they provide the civilian population. There are three military installations in the Tar-Neuse Study Area, all in MC PR P. They are: Seymour Johnson Air Base, Wayne County; Camp LeJeune Marine Base, Onslow County; and the Marine Air Base at Cherry Point, Craven County. In 1940 there were 112 military personnel[2/] in the Tar-Neuse Study Area, and this number increased to 52,690 in 1970 (Table 14). Military personnel were located in 30 of the 35 counties in the study area in 1970. These include: ROTC facilities at high schools, colleges, and universities, recruiting personnel, military components of the selective service system[3/], military personnel assigned to reserve and national guard armories and some military personnel associated with civil works projects of the Corps of Engineers.

To project the military component of the population as the basis of the historical experience of record would most likely be to err in overstatement. The most secure assumption is that the military personnel numbers will remain constant. OBERS is projecting

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1/ Some examples of non-working people in the working age population are: housewives, students, inmates of institutions, and long-term hospital patients.

2/ Internal data, ERS, Raleigh.

3/ The President's induction authority expired on July 1, 1973.

the national military numbers to be cut back to about 3,000,000 by 1975, and this level to be maintained throughout the projection period. Because of the nature of the installation in the study, some reduction is anticipated in the short run as a result of the current general reduction in military force. In the longer run, the number of military personnel in the Tar-Neuse Study Area is expected to stabilize to a peacetime security maintenance level. This conclusion is felt reasonable in light of the customary marine type military objectives and the current strategic security threat.

Civilian: The civilian labor force (571,720-Table 14) of the study area accounted for 91.6 percent[1/] of the total labor force and compares with national estimates of 95.8 percent (Figure 8). This difference reflects the larger military proportion of the study area than at the national level. The civilian labor force is directly associated with the goods and services produced in the region. The military component of the total labor force provides only services; i.e., security service. Water resource development is likely to have a lesser impact on the economy of a region where service industries are more dominant than in other regions.

The Tar-Neuse Study Area, as with the rest of the nation, has an increasingly larger proportion of women going to work. In the nation, between 1950 and 1970, the number of employed males grew

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1/ Civilian Labor Force divided by the Sum of the Civilian Labor Force and the Armed Force.

by 20 percent and the employed females by 70 percent[1/]. In the Tar-Neuse Study Area between 1950 and 1960, the number of males working declined about 10 percent, while the women going to work increased 75 percent.

From a sample of firms that moved into the area, work was offered that could be done by homemakers, probably more dexterous, who could be easily and quickly trained on the job with a minimum of investment in training. For example, some firms lacking intensive capital investment came into the region with assembly type operation requiring low skill levels, paying lower wages, probably doing little to raise the living standards.

Table 15 presents data on two towns selected at random, towns outside the principal industrial area yet within the study area. The table shows the kind of industries that have moved into a rural area and the male and female distribution among these industries. Most of the firms, 11 out of 16, moved into towns A and B during the 1950's and 1960's, when there was a large number of people leaving agriculture. In towns A and B, the industries hiring female workers were: textiles, appliances, tobacco processors, and pharmaceuticals; and they hired 63 percent more women than men.

INDUSTRY

Change in the number of labor force employed and unemployed, does not reveal the use of labor in its productive

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1/ White Conference Staff, A Look at Business in 1990, U. S. Government Printing Office, Washington, D. C., November 1972, p. 50.

Table 15 - Distribution of male-female employment in two towns by type of employment and year firm was established Tar-Neuse River Basin Study, North Carolina-1973

| Town and Product of Manufacturer | Employees | | Firm Established |
|---|---|---|---|
| | Male | Female | |
| | Number | | Year |
| **Town A** | | | |
| Small Appliances | 193 | 732 | 1966 |
| Texturized Yarn | 520 | 630 | 1954 |
| Shirts | 29 | 394 | 1952 |
| Truck & Bus Bodies | 210 | 14 | 1946 |
| Lumber & Building Supplies | 140 | 4 | 1904 |
| Dress Making | 8 | 120 | 1956 |
| Industrial Filters | 103 | 14 | 1969 |
| Fiber Glass Boats | 175 | 45 | 1970 |
| Industrial/Nuclear Valves | 46 | 3 | 1972 |
| **Town B** | | | |
| Brushes | 77 | 149 | 1954 |
| Yarn | 159 | 211 | 1959 |
| Boats | 145 | 30 | 1960 |
| Boy's Shirts | 46 | 260 | 1963 |
| Flashlight Batteries | 193 | 125 | 1952 |
| Tobacco Processing (Seasonal*) | 400 | 600 | 1954 |
| Pharmaceutical | 341 | 413 | 1970 |

*Seasonal -- Is equivalent to 200 woman-years and 200 man-years

Source: Community Audit, Community Services of the Commerce and Industry Division, North Carolina Department of Natural and Economic Resources, Raleigh.

pursuits. Further, not much is indicated about the well-being[1/] of people. The employment by industry and the industry mix can give some direction in the assessment of increased output of goods and services and the implications for environmental concerns and regional socio-economic problems.

Since the result of the production process is either a good or a service, the industries were separated into goods producing and non-goods producing categories, and those employed in each were aggregated for 1950, 60, and 70 for the study area. This structuring of employment helps to understand and analyze those industries that use the natural resources and may broadly indicate something of resource substitution. Societies with high levels of living tend to be oriented to non-goods than goods producing. These societies are usually advanced technologically. Technology, according to Hansen, puts a ceiling on employment in the production of material goods[2/]. Those workers displaced by technology are released for employment in the non-goods industries. In the recent past, more people were employed in the non-goods industries (Table 16).

In 1950, 58 percent of those employed were engaged in goods producing industries. Of these, agriculture employed the greatest number (about 164,000) (Table 16). In 1970, 58 percent of those employed were engaged in non-goods producing industries. Of these,

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1/ Well-being is the result of some mix of economic and non-economic activities that yield income and non-income satisfaction.

2/ Hansen, Alvin H., Economic Issues of the 1960's, McGraw-Hill, New York, 1960, pp 71-72.

Table 16 - Distribution of employment among the goods and non-goods producing industries
Tar-Neuse River Basin, North Carolina -- 1950, 1960, and 1970

| Industry | SIC[1] | 1950 | 1960 | 1970[2] | 1950 | 1960 | 1970 |
|---|---|---|---|---|---|---|---|
| | | Number | | | Percent | | |
| **Goods Producing** | | | | | | | |
| Agriculture, Forestry, & Fishery | 01-09 | 163,770 | 100,459 | 50,823 | 57.8 | 41.2 | 19.1 |
| Mining | 10-14 | 723 | 597 | 1,500 | 0.3 | 0.3 | 0.6 |
| Contract Construction | 15-17 | 27,739 | 31,138 | 42,630 | 9.8 | 12.8 | 16.0 |
| Manufacturing | 20-39 | 71,220 | 90,337 | 141,335 | 25.1 | 37.1 | 53.1 |
| Transportation & Public Utilities | 40-49 | 20,096 | 21,112 | 29,870 | 7.1 | 8.7 | 11.2 |
| Total | | 283,548 | 243,643 | 266,158 | 58.4 | 45.8 | 41.3 |
| **Non-Goods Producing** | | | | | | | |
| Wholesale & Retail | 50-59 | 68,069 | 84,675 | 108,751 | 33.7 | 29.4 | 28.8 |
| FIRE[3] | 60-67 | 8,148 | 13,739 | 21,778 | 4.0 | 4.8 | 5.8 |
| Service | 70-89 | 83,173 | 110,300 | 163,588 | 41.2 | 38.3 | 43.3 |
| Government | 91-97 | 35,680 | 63,838 | 83,586 | 17.7 | 22.2 | 22.1 |
| Industry - Not Reported | 99 | 6,846 | 15,281 | - 4/ | 3.4 | 5.3 | - 4/ |
| Total | | 201,916 | 287,833 | 377,703 | 41.6 | 54.2 | 58.7 |
| GRAND TOTAL | | 485,464 | 531,476 | 643,861 | 100.0 | 100.0 | 100.0 |

1/ Standard Industrial Classification
2/ The 1970 census " industrial not reported" category was allocated to a major group; i.e., 1970 not exactly comparable.
3/ Finance, Indusrance, Real Estate
4/ Dash indicates information not available

Source: Derived by ERS, Raleigh from Lowell D. Ashby, Growth Patterns in Employment by County, Vol. 5 Southeast, U. S. Department of Commerce, Office of Business Economics, U. S. Government Printing Office, Washington, D. C., 1965 and 1970 Census of Population, General Social and Economic Characterics, U. S. Department of Commerce, Bureau of Census, Washington, D. C. April 1972.

the service industries employed the greatest number (about 164,000). Agriculture employed the largest number of people in 1950, 34 percent of all employed. By 1960, the service industry led in employment and has continued to lead in total employment up to 1970. Employment has declined the most in agriculture and increased the most in service and manufacturing (Figure 9).

The shift in employment to the non-goods producing industries, specifically the service group, began largely in the 1950's and increased by almost doubling in the 1960's. The period 1950 to 1970 was a time of wide shifts in the deamnds for labor and a reversal in the employment structure between the goods and non-goods producing sectors. Greater labor mobility and increased training activities accompanied this situation.

It would be tempting to conclude that those leaving agriculture entered the service industries. Earlier, Table 4 indicated that Multi-County Planning Region J experienced a net in-migration in the 1960's. Region J also had the largest increase in those employed in the service industries[1/]. In this instance, some of the increase in the employment in the service sectors could have come from outside of the region. Further, labor from agriculture is not likely to enter hotel management, laundry, advertising, education, or health service fields without extensive retraining. Franchise arrangements, now popular, require investment capital that the average farmer is not likely to have. It is more likely

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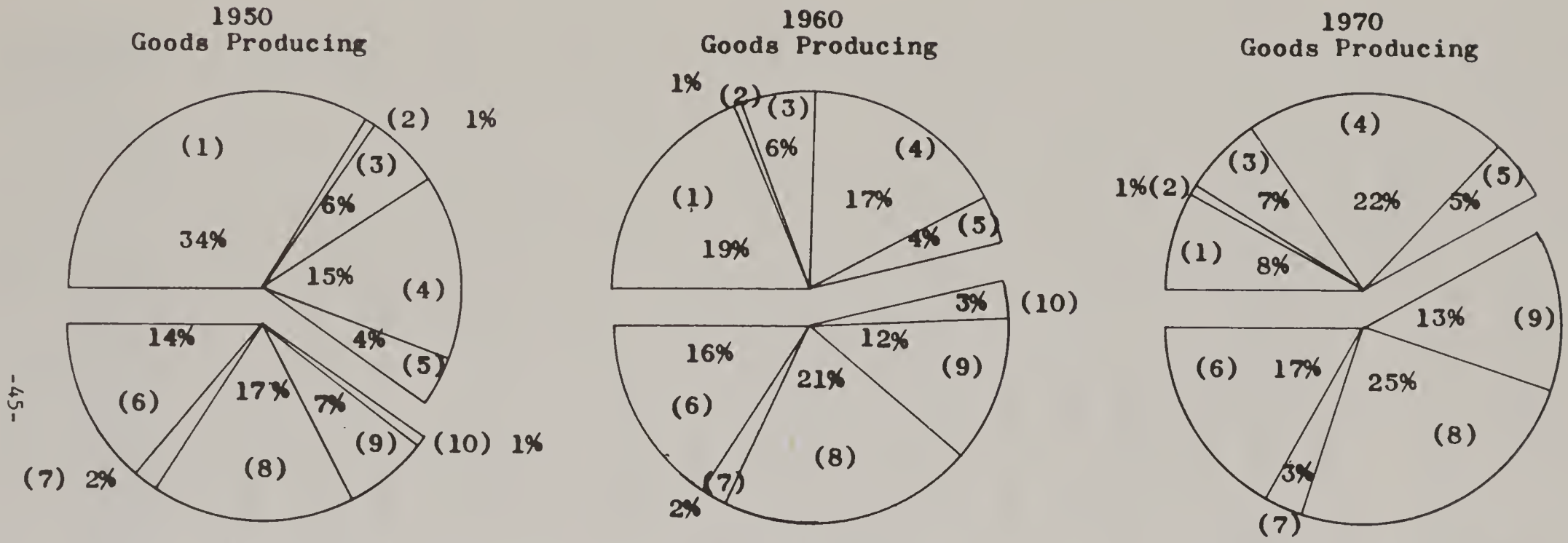
1/ Derived from unpublished data, ERS, Raleigh, May 1973.

Percent of total employed, goods and non-goods producing industries, Tar-Neuse River Basin Study, North Carolina, 1950, 1960, and 1970






| GOODS PRODUCING | NON-GOODS PRODUCING |
|---|---|
| (1) Agriculture-Forestry-Fishery | (6) Wholesale and Retail |
| (2) Mining | (7) Finance, Insurance, Real Estate |
| (3) Contract Construction | (8) Service |
| (4) Manufacturing | (9) Government |
| (5) Transportation and Public Utilities | (10) Industry not Reported |

SOURCE: Derived by ERS, Raleigh, from Ashby, L. D., Growth Patterns in Employment by County, U. S. Department of Commerce, Office of Business Economics, Vol. 5, Southeast, Washington, 1965 and U. S. Department of Commerce, Bureau of Census, 1970 Census of Population PC (1)-C35, Washington, D. C., April 1972.

FIGURE 9

that those leaving agriculture would enter construction and manufacturing. The farmer usually has skills adaptable to construction, and the housewife skills adaptable to light manufacturing. Manufacturing did show sizeable increases in employment, especially during the 1960's (Table 16).

From the information in Table 16 and Figure 8, it seems most likely that manufacturing would be the source of future jobs in the region[1/]. However, industries locating in the region will not be confronted with an agricultural environment as in the past. Without a cheap source of labor, and if technology continues to improve and does put a ceiling on employment as Hansen asserts, then manufacturing employment may not grow as anticipated.

What are the natural resource implications? At this stage of analysis, only a broad indication can be gained. The doubling of those employed in manufacturing between 1950 and 1970 would lead one to suspect that substantial increase in the use of natural as well as synthetic or man-made resources took place. Included in the manufacturing division are such major groups of industries as: food and kindred products; textile mill products; chemicals and allied products, which are generally large users of water. In the adjacent Cape Fear River Basin, it was found that textiles (SIC 22)[2/] and food products industries (SIC 20)[2/] accounted for just over 80 percent of the water used in all industrial manu-

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1/ For a special report on manufacturing growth in the South and North Carolina, see Business Week, The New Rich South, Frontier for Economic Growth in the 1970's , No. 2244, September 2, 1972, McGraw-Hill, Inc.

2/ Standard Industrial Classification major group 22-Textile Mill Products, 20 Food and Kindred Products

facturing in 1967[1/], and there was some evidence that these industries, in isolated cases, contributed heavily to waste loadings of streams and local treatment plants[2/].

Industry Mix: Industries and areas grow at varying rates, and industrial growth is related to the mix of industries in an area. Industrial[3/] growth is usually followed by increased demand for labor. Populations increase, demands increase, and waves of economic activity spread and cause general improvement in the economy. It is approriate then, in studying a subregion to know relatively whether the region has gained or lagged behind other regions in industrial growth and job formation.

From national mix and regional share study[4/], five industries adding and losing employment were selected (Table 17). Four of the five major industries losing employment in the United States in the 1950's were the same as those losing employment in the study area. Only two out of five major industries adding employment in the United States were the same one's adding employment in the study area. In contrast, expectations for 1969 to 1980 are that four of the same employment-adding industries are as likely to be

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1/ Economic Studies Work Group, Parks, John R., Chairman, Cape Fear River Basin, Joint Study, Appendix B, Raleigh, February 1971, p B-15, unpublished.

2/ Ibid., p B-20.

3/ Industrial is a broad term for all Standard Industrial Classification Industries. It includes agriculture, manufacturing, service, wholesale and retail trade, etc. Industrial growth may be reflected in: (1) increased number of firms; (2) increased investment of established firms; and (3) change in mix of firms.

4/ Ashby, Lowell D., Growth Patterns in Employment by County, U. S. Department of Commerce, Office of Census, Washington, D. C., 1965.

Table 17 - Industries ranked by change in employment Tar-Neuse Study Area and United States
Tar-Neuse River Basin Study, North Carolina, selected years

| | Tar-Neuse Study Area | | | United States | | |
|---|---|---|---|---|---|---|
| Rank | 1940 -- 1950 | 1950 -- 1960 | 1969 -- 1980 | 1940 -- 1950 | 1950 -- 1960 | 1969 -- 1980 |
| | Added Employment | | | Added Employment | | |
| 1st | Armed Forces | Armed Forces | Public Admin. | Professional Svcs. | Professional Svcs. | Public Admin. |
| 2nd | Other Retail Trade | Professional Svcs. | Services[1] | Other Retail Trade | Elec. & Machinery Mfg. | Professional Svcs |
| 3rd | Professional Svcs. | Other Retail Trade | Elect. & Machinery Mfg. | Contract Construction | Other Retail Trade | Wholesale & Retail Trade[2] |
| 4th | Contract Construction | FIRE[3] | Wholesale & Retail Trade[2] | Other & Misc. Mfg. | Other & Misc. Mfg. | Elec. & Machinery Mfg |
| 5th | Public Admin. | Private Households | Other & Misc. Mfg. | Public. Admin. | FIRE[3] | Business & Repair Svcs. |
| | Lost Employment | | | Lost Employment | | |
| 1st | Agriculture | Agriculture | Agriculture | Agriculture | Agriculture | Agriculture |
| 2nd | Private Households | Lumber, Wood Prod. Mfg. | Armed Forces | Private Households | Railroads & Express | Armed Forces |
| 3rd | Textile Prod. Mfg. | Textile Prod. Mfg. | TCPU[4] | Mining[5] | Textile Prod. Mfg. | Primary Metals |
| 4th | Chemical Prod. Mfg. | Railroads & Express | Food. Prod. Mfg. | Forestry & Fisheries[5] | Mining[5] | Railroads & Express |
| 5th | Apparel Mfg. | Forestry & Fisheries[5] | Lumber, Wood Prod. Mfg. | Entertainment Servcs.[5] | Lumber, Wood Prod. Mfg. | Mining[5] |

1/ Detail not available for study area, includes professional services, private household, amusement business and lodging services.
2/ Detail not availabe for study area, includes food stores and eating places
3/ FIRE - Finance, Insurance, Real Estate
4/ Transportation, communication, and public utilities
5/ Industries that added the least

Source: Ashby, Lowell D, "Growth Patterns in Employment by County", U. S. Dept. of Commerce, Office of Census, Washington, D. C., 1965, for 1940-1950 and 1950-1960, Water Resource Council, OBERS Projections , Washington, D. C., September 1972, for 1969-1980.

found in the study area as in the United States. They are: (1) public administration; (2) services, which include professional services; (3) electrical and other machinery manufacturing; and (4) wholesale and retail trade.

There are some possible explanations for the lagging employment growth in the study area. Industry managers may be substituting other inputs for labor, and this would imply that the use of other resources, to the extent they can be substituted for labor, is more profitable. Pertinent to resource development, although it may be academic, are the questions: Have water and land resources been substituted for labor? Will there be further substitution of the water and land resources for labor after the quantity and quality of these resources have been improved through development? These questions are quite difficult to answer but germane to resource development. Other and more widely recognized explanations of the lagging employment growth are: a lack of industries coming into the region in the 1940's and 1950's, and substitution of technology for labor, especially in agricultural mechanization. In a greater sense, the lagging employment caused by substitution of other productive inputs may have caused an overall improvement in resource allocation.

Industry Importance: A simple tool for exploring the important industries of a region is the Location Quotient[1/] (LQ), calculated

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1/ For other applications, see Isard, Walter - Methods of Regional Science, Chapter 5, MIT Press 1960, and Virgil L. Whetzel, An Application of the Economic Base , NRED, ERS, "An Analysis of Capital Flows in Randolph and Upshur Counties, West Virginia", July 1973. The earnings location quotient were calculated as follows:

$$\frac{\text{Basin Earnings from Industry A}}{\text{Basin Earnings from all Industries}} = \%$$

$$\frac{\text{National Earnings from Industry A}}{\text{National Earnings from all Industries}} = \%$$

from a ratio of percentages of regional earnings. If the Quotient is greater than one for an industry in a region, then that industry is relatively more important there than in the region of comparison, in this case the nation. If information is available over time, it is a simple matter to see which industries have gained in importance in which regions.

Location Quotients were calculated for each of the six major industrial divisions and for the eight industries in the manufacturing division. Quotients were calculated for the eight industries in the manufacturing division because this was the only division to gain in importance and is the division which contains many of the large water-using industries. The objective was to isolate growth industries that were water-using. Agriculture, forestry-fishery, armed forces and the civilian government divisions are also "important" in the Tar-Neuse Water Subarea. Their LQ's were greater than one in 1950 and are expected to be greater than one at 2020 (Figure 10).

Of the eight industries in the manufacturing division, four were relatively more important in the study area than in the rest of the nation in 1950. By 2020, seven industries are expected to be relatively more important. The four industries that were considered relatively unimportant in 1950 and that are expected to grow in importance by 2020 are (Figure 11):

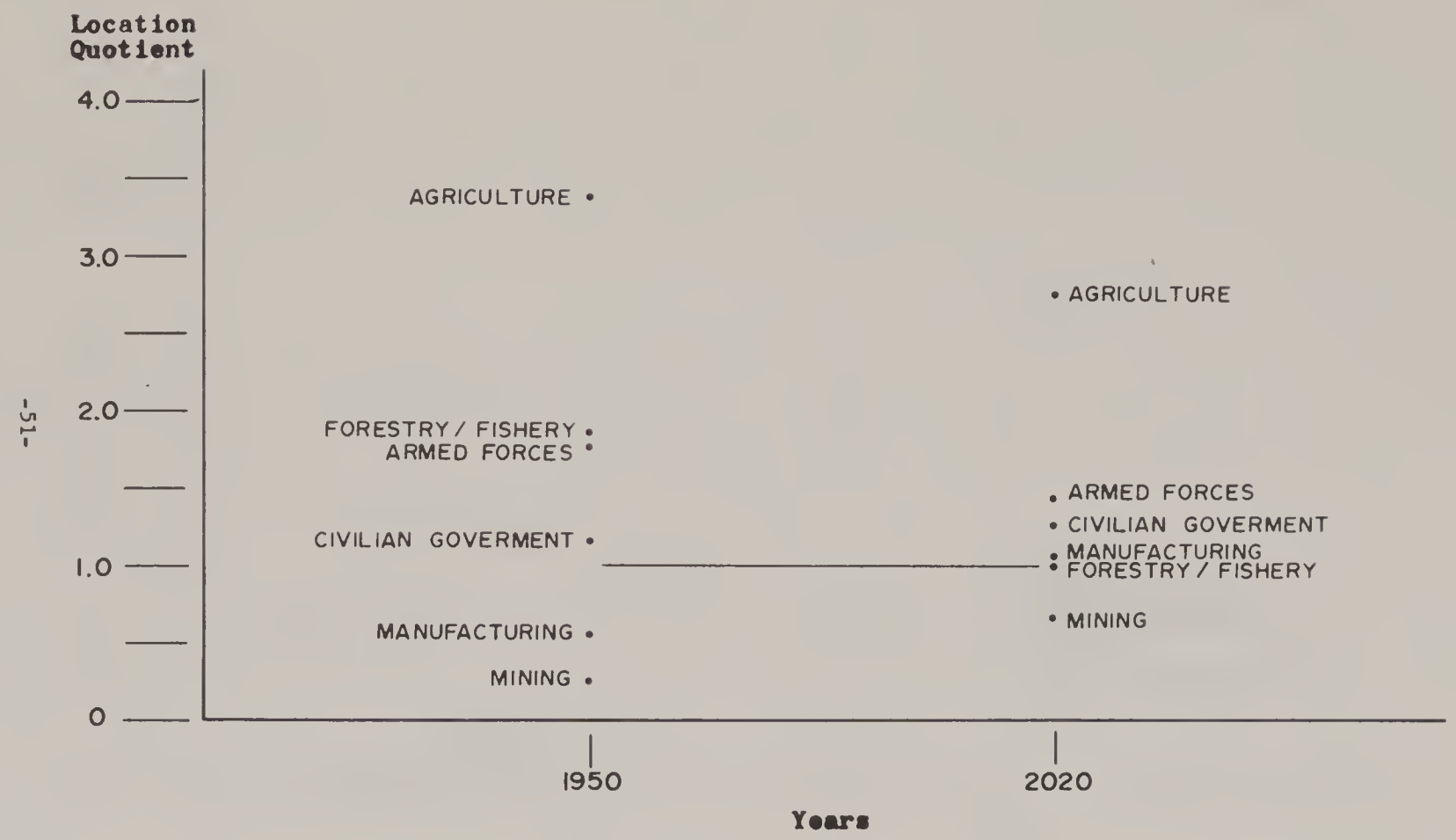
Apparel and Other Allied Products

Chemical and Other Allied Products

Electrical Machinery and Supplies

Machinery, Excluding Electrical

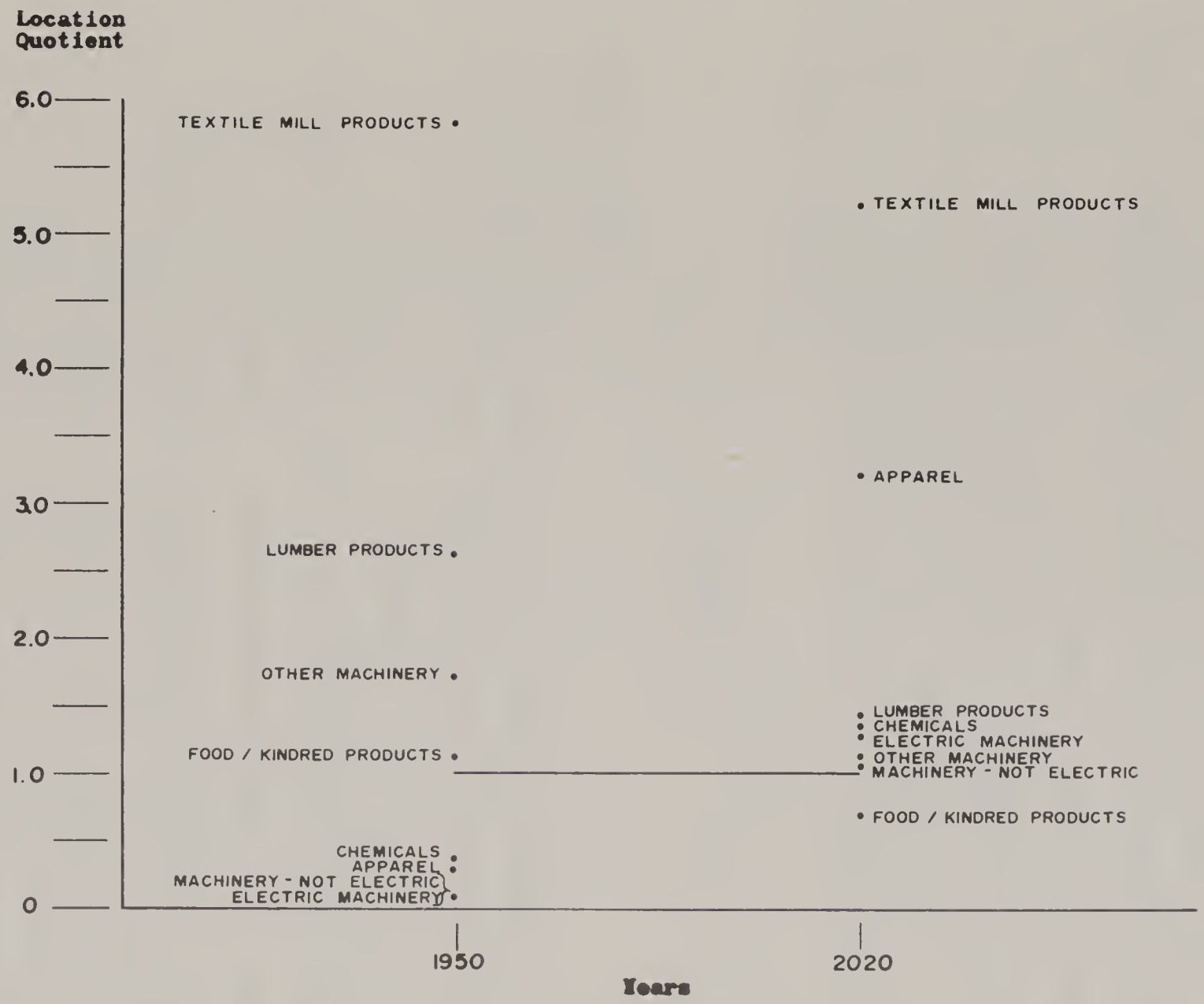
Importance of the Major Industrial Divisions Tar-Neuse Water Resource Subarea with respect to the Nation, North Carolina, at 1950 and 2020




SOURCE: Derived by ERS, Raleigh, from U. S. Water Resource Council, 1972 OBERS Projections, Vol. 3, Washington, D. C., September 1972.

FIGURE 10

Importance of Industries Within the Manufacturing Sector, Tar-Neuse Water Resource Subarea, with respect to the Nation, North Carolina, at 1950 and 2020




SOURCE: Derived by ERS, Raleigh, from U. S. Water Resource Council, 1972 OBERS Projections, Vol. 3, Washington, D. C., September 1972.

FIGURE 11

Of the seven industries expected to be important in 2020, three are usually considered to be "large volume water users", textile mill products, chemical and allied products and electrical machinery and supplies. For these industries both volume and cost of water supply is important. Agriculture, of course, is the largest "user" of water; however, most of it is supplied as rainfall without cost. If water does become a limiting factor in production and technical substitutes are not available, then water supply may be a future concern in manufacturing and agriculture in the Tar-Neuse Water Resource Subarea.

## INCOME

### PERSONAL INCOME

Personal income is a measure of well-being, an aggregate of what people can save or spend. Personal income is sometimes categorized into: (1) earnings and (2) non-earnings. Earnings include: (a) wages and salaries; (b) other labor income; (c) net income of owners of unincorporated businesses. Non-earnings include: (a) rental income; (b) dividends; (c) interest; and (d) transfer payments. Earnings make up about 80 percent of total personal income. In the Tar-Neuse Study Area between 1950 and 1970, personal income increased from $1,783 to $4,173 billion. At the same time, the population increased from 1,371 to 1,638 million (Table 18). At first, one might conclude that the well-being of the people has improved and indeed,

Table 18 - Personal income[1/] and population of the Tar-Neuse River Basin Study, North Carolina 1950, 1959, and 1970

| Item | 1950 | 1959 | 1970 |
|---|---|---|---|
| Personal Income (Bil.) | $1.783 | $2.274 | $4.173 |
| Population (Mil.) | 1.371 | 1.522 | 1.638 |

1/ Constant dollars 1967 = 100.

Source: Derived by ERS, Raleigh from Bureau of Census information.

there has been some improvement. But as will be shown later, the distribution among certain groups and areas is not as impressive as the aggregate figures might imply.

Per Capita Income: A more direct and widely used indicator of well-being is the per capita personal income (Table 19). In all Multi-County Planning Regions (M-C PR), personal incomes have risen over each previous time period observed. There is, however, considerable variation in per capita incomes among the regions. In 1970 the highest per capita regional income was $2,817 in MC PR J, the lowest $2,134 in K. The county level estimates showed an even wider range. Onslow had a per capita income of $3,269 and Washington County $1,384, a difference of $1,885[1/].

In general, the more rural regions exhibited greater increases in incomes than the urban areas, and these increases were not uniform over the period observed. The major increases in per capita income

1/ Unpublished data of the ERS, Raleigh in 1967 dollars

Table 19 - Per capita personal income by Region
Tar-Neuse River Basin Study, North Carolina
selected years

| Region | 1950 | 1959 | 1965 | 1970 | 1980[1/] | 2000[1/] | 2000[1/] |
|---|---|---|---|---|---|---|---|
| | 1967 Dollars | | | | | | |
| Multi-County Planning Region | | | | | | | |
| J | 1,467 | 1,792 | 2,271 | 2,817 | -- | -- | -- |
| K | 1,125 | 1,235 | 1,646 | 2,134 | -- | -- | -- |
| L | 1,229 | 1,334 | 1,776 | 2,308 | -- | -- | -- |
| P | 1,366 | 1,575 | 1,996 | 2,652 | -- | -- | -- |
| Q | 1,068 | 1,194 | 1,680 | 2,230 | -- | -- | -- |
| Hydrologic Residual | 1,298 | 1,545 | 1,911 | 2,418 | -- | -- | -- |
| Tar-Neuse Study Area | 1,301 | 1,518 | 1,971 | 2,600 | -- | -- | -- |
| Water Resource Subarea[2/] | 1,287 | 1,499 | 1,850[3/] | 2,662[3/] | 3,740 | 7,048 | 12,807 |
| North Carolina | 1,431 | 1,705 | 2,087[3/] | 2,862[3/] | 3,942 | 7,154 | 12,735 |
| United States | 2,065 | 2,441 | 2,875[3/] | 3,539[3/] | 4,765 | 8,289 | 14,260 |

1/ Projections by Multi-County Planning Regions not available.
2/ The region specified by the Water Resource Council to approximate the hydrologic region of the Tar-Neuse Rivers.
3/ Extrapolated

Source: MC PR and Tar-Neuse Study Area derived from Bureau of Census by ERS, Raleigh, WRSA, N.C. and U. S. from WRC, OBERS Projection, Vol. 3 and 5, Washington, D. C. September 1972.

occurred in the 1960's. Multi-County Planning Region L growth in income was nine times more than it was in the 1950's. Between 1950 and 1959, per capita income increased $105, between 1959 and 1970 - $974. In comparison per capita personal income increased three times in MC PR J, a more urban region.

The study area and the Tar-Neuse Water Resource Subarea (WRSA) 302[1/] have lagged behind the state and the United States in per capita income. However, by 2020, incomes in the WRSA are expected to improve and by that time per capita incomes will be slightly higher in the WRSA than in the state (Table 19).

Family Income: Family income includes the income from all members of the family 14 years old and older. The family income, unlike per capita income, is more associated with a level of living and does indicate, although grossly, the welfare of the family and thereby, of society. Median family income is the mid-point of the distribution of incomes of all families.

Median family incomes have increased in all Multi-County Planning Regions. However these increases have been quite erratic, with the largest increases occurring between 1959 and 1969 (Table 20), and have varied widely among regions. At no time since 1949 had the median family income in the study area been above that for the United States, and only in MC PR J has it been above that for the state. Although the median family income has increased, so has

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1/ This is a delineation by the Water Resource Council, Washington, D. C. of the hydrologic area of the Tar-Neuse and it closely approximates the hydrologic area approved for study by the Tar-Neuse Field Advisory Committee. Per capita income projections are available only from the Water Resource Council by Water Resource Subareas.

Table 20 - Family income and average annual change by Region, Tar-Neuse River Basin Study, North Carolina, selected years

| Region | Annual Family Income | | | |
|---|---|---|---|---|
| | 1949 | 1959 | 1969 | Average Change 1959 to 1969 |
| Multi-County Planning Region | ----------Dollars---------- | | | ----Percent----- |
| J | 3,395 | 4,978 | 7,807 | 5.7+ |
| K | 2,384 | 3,172 | 5,791 | 8.3+ |
| L | 2,522 | 3,342 | 5,668 | 7.0+ |
| P | 2,412 | 3,662 | 5,934 | 6.2+ |
| Q | 2,073 | 2,867 | 5,546 | 9.3+ |
| Hydrologic Residual | 2,717 | 4,329 | 6,849 | 5.8+ |
| Tar-Neuse Study Area | 2,703 | 3,930 | 6,546 | 6.7+ |
| North Carolina | 2,999 | 4,532 | 7,080 | 5.6+ |
| United States | 4,304 | 6,483 | 8,734 | 3.5+ |

Note: The average annual change in the cost of an intermediate budget of a four person family between the Srping of 1967, in Durham, North Carolina, was 6.0 percent; for the U. S. it was 5.8 percent. This is published in U. S. Department of Labor, Bureau of Labor Statistics, Three Standards of Living for an Urban Family of Four Persons, Bul. No. 1570-5, Washington, D. C., Spring 1967 and Supplement for 1972.

Source: U. S. Department of Commerce, Bureau of Census, Census of Population, Washington, D. C.

the cost of a budget of a four person family. The average annual increase in the median family income was 6.7 percent in the Tar-Neuse Study Area compared with 3.5 percent in the United States (Table 20). Comparable data for a family's out-go are not available

for the regions; however, the Bureau of Labor Statistics has estimated an annual cost of an intermediate budget for a four person family in Durham, North Carolina. The average annual change in the cost of living estimate was 6.0 percent in Durham between 1967 and 1970 and 5.8 percent in the United States (Table 20).

The median family income parameter can be used to compare changes among regions, but it tells little about how the total income is distributed. The number of families by size of income is most important in that it shows how the great bulk of people share the total income. In 1960 over two-thirds of the families had family incomes less than $5,000, but by 1970 there were more families in the upper income group. In 1970 there was a large group with low incomes and a large group with high incomes with a relatively small proportion in the middle level. This situation is strikingly different from the national distribution where the middle income group has,in the past,been larger than the lower or upper income group (Table 21).

Table 21 - Percent of families by size of income
Tar-Neuse River Basin Study, North Carolina
1960 and 1970

| Income | 1960 | 1970 |
|---|---|---|
| | Percent | |
| Less than 2,000 to 4,999 | 68.3 | 33.1 |
| 5,000 to 7,999 | 20.1 | 23.4 |
| 8,000 to over 10,000 | 11.6 | 43.5 |

Source: Census of Population

Wallich[1/] suggests four "corrections" that are necessary to the lower income groups to help offset the bleakness of the numbers in Tables 20 and 21: (1) Transients and other part-year workers enter and leave the labor force; e.g., college students starting a $6,000-a-year job after graduation enter the less-than $4,000 group. In the United States, three and one-quarter million enter and leave the labor force each year; (2) Capital consumption by older people explains a part of the low income situation; (3) (3) Cost of living varies within the United States,and one living on a $2,000 income would be less uncomfortable in the rural area than the urban; and (4) Low income families have the advantage of being smaller. One-half of them consist of only two people[2/]. Further, more low income families own their home mortgage free than do moderate income families. Wallich also observes that the top brackets are understated as they do not allow for unrealized capital gains.

EARNINGS

The earnings category of personal income is the sum of: (1) wages and salaries; (2) other labor income, such as employer contributions to private pension plans, health and welfare funds; and (3) proprietors' income, such as net incomes of owners of

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1/ Wallich, Henry C., The Cost of Freedom, Harper & Brothers, New York, 1960.
2/ Wallich, Henry C., op.cit.

unincorporated business, farm and non-farm, independent professionals, etc. Earnings account for 80 percent of total personal income. The earnings component of personal income is most directly affected by water and related land resource development and earnings in turn affect both property income and transfer payments, the other components of personal income. Increased earnings generally mean greater demands that might be for more water-using appliances in the home, that might be for water-based recreation or any of the direct or indirect demands for natural resources.

Growth of total earnings in the Tar-Neuse Water Resource Subarea (T-N WRSA) is roughly keeping pace with North Carolina and the United States. Total earnings increased 1.22 times in the T-N WRSA, 1.35 times in North Carolina and 1.14 times in the United States between 1950 and 1969 in constant 1967 dollars[1/].

A majority of the industries in the T-N WRSA had earnings that increased from 1950 to 1969, only agriculture, forestry and fishery earnings showing a downward trend.

By 1990 manufacturing and civilian government are expected to be the major "growth in earnings" industry with each one expected to have $1.4 billion of earnings. Manufacturing earnings are expected to increase seven times and civilian government earnings eleven times what they were in 1950 in the T-N WRSA[2/] (Figure 12). A number of industries in the manufacturing sector use water in

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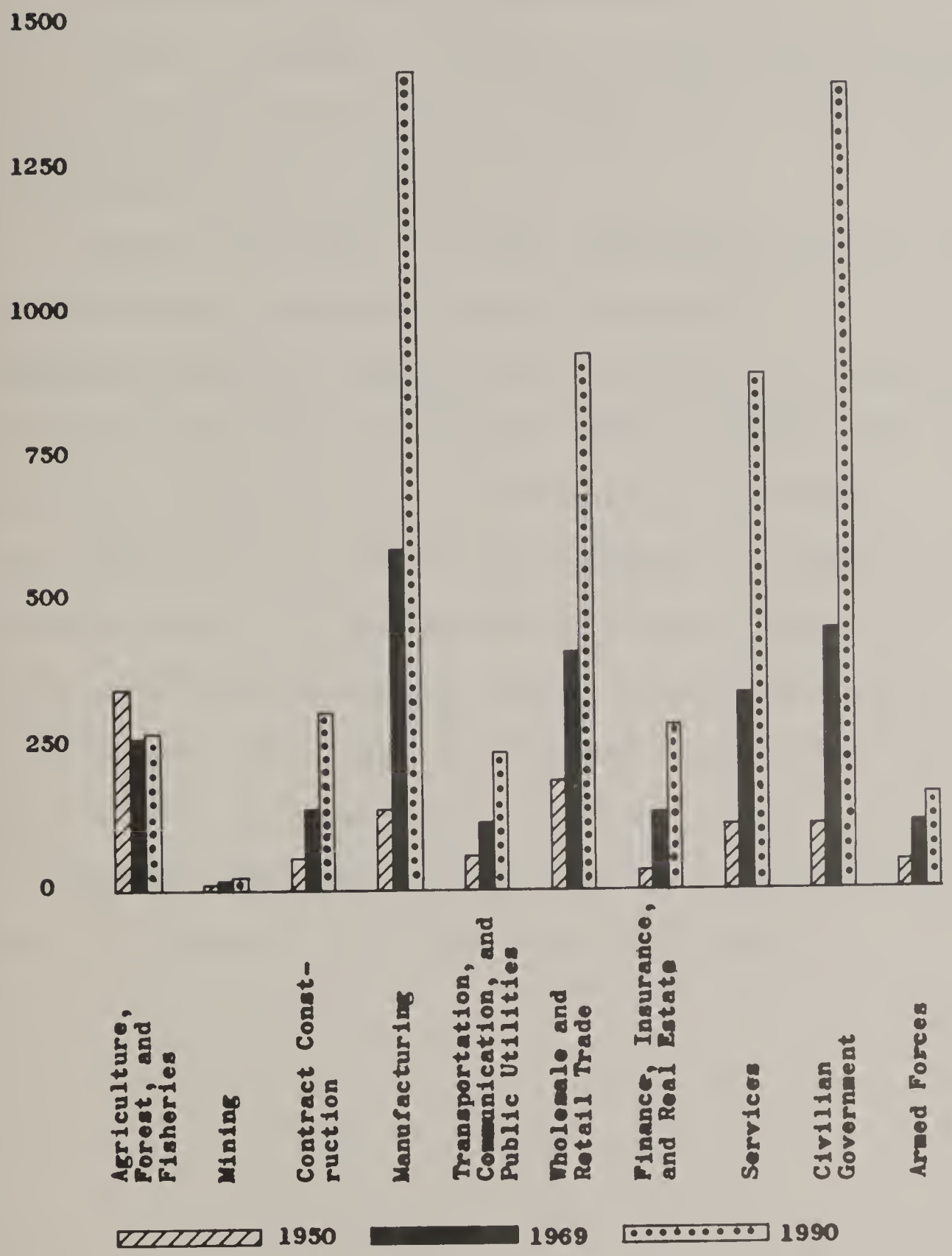
1/ Water Resource Council, OBERS Projections, Vol, 3 & 5, Washington, D. C., September 1972.
2/ Water Resource Council, op. cit., Vol 3, Table 1, p 78.

Earnings by industrial sector, Tar-Neuse Water Resource Subarea, North Carolina, years selected




SOURCE: U. S. Water Resource Council, 1972 OBERS Projections, Washington, D. C., September 1972.

FIGURE 12

the manufacturing process; for example, food and kindred products, chemicals and allied products, textile mill products, etc. The anticipated growth in earnings in manufacturing implies an increased use of natural resources. If these resources are not available and not of the required quality, a large number of those employed in manufacturing will be affected.

Earnings per worker are always larger than per capita personal income because earnings are distributed among just those who are employed, whereas per capita income is a result of dividing the personal income among a much larger number of people - the total population. (Compare Table 19 with Table 22) Earnings per worker have increased in the past and are expected to increase in the future to 2020 in the Tar-Neuse Water Resource Subarea (T-N WRSA), North Carolina and the United States. Earnings per worker in the T-N WRSA have always lagged behind those for North Carolina, however by 1980 they are expected to converge at about $7,500 (Table 22). At sometime between 1990 and 2000, earnings per worker in the subarea will be greater than the average of the state.

Table 22 - Earnings per worker, Tar-Neuse Water Resource Subarea, North Carolina and United States for selected years

| Item | 1950 | 1959 | 1969 | 1980 | 1990 | 2000 | 2020 |
|---|---|---|---|---|---|---|---|
| | 1967 Dollars | | | | | | |
| Tar-Neuse WRSA | 3,155 | 3,640 | 5,344 | 7,600 | 10,000 | 14,000 | 24,000 |
| North Carolina | 3,306 | 3,864 | -- | 7,500 | 10,000 | 13,000 | 23,000 |
| United States | 4,502 | 5,360 | 6,853 | 9,400 | 12,000 | 16,000 | 27,000 |

Source: Water Resource Council, OBERS Projections, op.cit.